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Public Health Reports

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—Editorial—

Tuberculosis in Mental Hospitals

If tuberculosis control is to reach its proper goal—the disappearance of tuberculosis from the United States—every reservoir of infection must be found and eliminated. One of the great sources of infection still remaining in this country may be found among inmates of mental institutions. Over and over again we have been told of the high rates of disease which prevail there. In 1946 there were 635,769 mental patients in the United States, and 4,247 of them died of tuberculosis. This is a rate of 668.0 per 100,000 in contrast to 36.4 for the general population. Deaths from tuberculosis in mental institutions comprised 8.3 percent of the total deaths from tuberculosis in the United States during that year.

We know that the disease spreads from mental institutions to the community through employees and discharged patients. Dr. Oechsli, in his paper (appearing in this issue) on tuberculosis control in California mental institutions, points out that 7,921 of the 25,810 California mental patients were paroled or discharged from parole in the year 1944–45. In the entire United States about 270,000 mental patients are coming back into the community each year. The spread of the disease from those who may have contracted tuberculosis while in mental hospitals therefore becomes a community problem which we cannot afford to ignore.

The American Trudeau Society at its meeting of June 1946 recommended that each State establish a service to control tuberculosis in mental institutions. The Society said all patients and employees should be X-rayed on admission and periodically thereafter to find the prevalence of disease in each institution. The active and probably active tuberculous patients should be segregated as soon as possible. In populous States they could be grouped in one or more institutions

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This is the thirty-fifth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year; $1.25 foreign.

depending on the size of the problem and their multiple diagnoses. Medical and nursing service should be provided. Possibly, medical and nursing staffs of special tuberculosis centers could serve as consultants or administrators of the control program in mental institutions. Complete case reporting should be practiced, so that health departments can make follow-up examinations of the families of patients and of the patients themselves.

This program obviously should be carried out. But putting it into practice is not easy.

In the first place, mental institutions in almost every part of the country are greatly overcrowded and distressingly understaffed. Dr. Oechsli tells us that institutions in California are as much as 25 percent overcrowded. In the United States as a whole, it has been estimated that facilities fail to meet requirements by some 300,000 beds. These conditions are bound to favor the spread of the disease, to make segregation more difficult and, at the same time, more imperative. Many mental hospitals have no facilities whatsoever for the treatment of tuberculous patients. The only step the authorities can take is to establish segregated wards for them, and even this precaution is often extremely difficult to carry out, for the requirements of the patients' mental conditions have to be considered as well.

The key to the entire problem lies in the initial case-finding process. Once cases are discovered, the importance of the problem is immediately recognized, and the diagnosis of tuberculosis becomes of itself a mandate which will impel the readjustment of existing facilities to cope with the problem. With some ingenuity this can be accomplished and the institution's population will be protected.

The Hospital Survey and Construction Act recommends a minimum standard for tuberculosis beds in mental hospitals amounting to 5 percent of the total beds. Were new construction feasible, and were it possible for us to attain this standard, this would, of course, provide one simple expedient. But new building has been almost nonexistent, and priorities are going to badly needed general hospitals rather than to mental institutions.

It has been suggested that prophylaxis for mental patients might offer some palliative for the proble of tuberculosis in mental hospitals. The Public Health Service, in cooperation with State health departments, is conducting several research programs in the techniques of BCG vaccination which will eventually add to our knowledge of the preventive value of BCG. Patients in State hospitals in Georgia, Michigan, Maryland and Ohio have been X-rayed and tuberculin-tested, and those not previously sensitive to tuberculin have been vaccinated on a controlled basis. It is too early, of course, to tell whether vaccination has been effective as a preventive. We have learned, however, that BCG vaccination among patients of mental institutions has decided limitations, because in Ohio for example, only one-quarter of the 10,000 tuberculin tested were eligible for vaccination.

On the other hand, the recommendation for case finding by X-ray of all patients and employees at intervals is now practicable. The availability of the photofluorograph makes this so. The American Hospital Association has discovered from a questionnaire sent to all its members that 154 of the mental hospitals in the United States made routine chest X-rays of all patients admitted in 1947. If a screening program is carried out in all the mental institutions, we can at least learn the magnitude of the problem, and attempts may be made to save many mental patients before infection has progressed to the active stage. Certainly the hazards of infection for employees could be materially reduced as a result of such action.

Admittedly, the elimination of tuberculosis from mental institutions is a long way off. Because of the danger to the community, as well as to patients and employees, it is necessary that we intensify our control efforts in mental hospitals. All control officers, public health officials and superintendents of mental institutions should urge that a case-finding program be adopted immediately for screening mental patients. They should also do their utmost to find ways of segregating and treating the cases found. The problem is urgent, and our solution to it must not be long delayed.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

Tuberculosis Control Program of Nine California Mental Institutions

Results of Initial Chest X-Ray Survey[1]

By **Waldo R. Oechsli, M. D.**, *Roentgenologist*

Survey of general hospital patients by X-ray is recognized as a productive field for tuberculosis case finding (*1–8*); mental institutions provide an even more productive field of investigation. The importance of the problem of tuberculosis in California mental institutions is indicated by the fact that the 25,810 resident population of the mental hospitals in the year 1944–45, forming only 0.3 percent of the population of California, contributed 4.4 percent of the deaths from tuberculosis. The death rate for tuberculosis for the seven mental hospitals and the two institutions for mental defectives, as in other States, was extremely high (table 1). The death rate of 657 per 100,000 in mental hospitals and 361 in institutions for mental defectives compares with a total tuberculosis death rate of 40.1 per 100,000 for the United States and a total tuberculosis death rate of 43.4 for California in the year 1945. Moreover, deaths from tuberculosis (1942–46) were 10 percent of the total number of deaths in the institutions, but were only slightly over 4 percent of the total deaths in the general population of California.

Table 1.—*Annual average death rate per 100,000 resident population for tuberculosis (all forms) in mental hospitals and institutions for mental defectives; California, 1922–1946*[1]

Period	Mental hospitals	Institutions for mental defectives
1922–26	950	766
1927–31	813	798
1932–36	643	553
1937–41	670	422
1942–46	657	361

[1] Figures for resident population are for fiscal years and the number of deaths for calendar years.

The problem is not confined to the tuberculous patients themselves but affects other patients, employees, relatives, friends, and the general population as well. Contrary to popular belief, there is considerable patient movement in mental institutions. For the year 1944–45, with 25,810 resident patients in 7 mental hospitals, there were 8,703 admissions and 3,069 returned from parole or escape. Extra-mural care is increasing. In the year 1944–45, there were 47 percent more patients on leave than in 1938. There were 5,397 patients paroled and 2,524 discharged from parole in 1944–45. It can therefore be recognized that any existing reservoir of infection in mental institutions constitutes a potential hazard both to the nontuberculous resident patients and employees, and to the population at large as well.

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[1] From the Division of Preventive Medical Services, California State Department of Public Health. Presented before the California Tuberculosis and Health Association, Long Beach, Calif., April 1, 1948

Overcrowding, which is widely recognized as a potent factor in the spread of tuberculosis in any environment, is a condition which probably exists in varying degrees in mental institutions everywhere. In California there have been great increases in the State's population over the years and a consequent increase in the number of patients admitted to State hospitals. The State has been unable to keep abreast of the requirements for beds for the mentally ill and it has been necessary for a number of years to admit more patients to mental hospitals than those hospitals were designed to care for. As a result, the mental hospitals were 24.5 percent overcrowded on June 30, 1945, and the institutions for mental defectives 26.9 percent overcrowded.

Recognizing the importance of the problem, Dr. Edward Kupka, Chief of the Tuberculosis Service in the California State Department of Public Health, made a study of the situation in California in 1942–43. Many patients were fluoroscoped in a number of hospitals with such productive results that the need for thorough screening was fully recognized. In 1944, by arrangements with the California Tuberculosis and Health Association, two mental hospitals were surveyed with 4″ x 5″ film, and the films were interpreted by this Department. These partial surveys revealed a prevalence of 5.7 percent new, previously unrecognized cases of tuberculosis at Napa State Hospital and 6.9 percent at Patton State Hospital.

Meanwhile, a joint program for long-range investigation had been drawn up by the Department of Public Health and the Department of Mental Hygiene, whereby all patients and employees were to be X-rayed by miniature film annually, the tuberculous patients segregated, and subsequently all new patients and new employees X-rayed with 14″ x 17″ film (*9*). In March 1946, the Department of Mental Hygiene purchased a mobile X-ray unit and from this date a continuing annual survey has been carried out.

Results—Mental Hospitals

During the first 11 months of operation 25,914 mental patients in 7 hospitals were X-rayed with 4″ x 5″ film. Of these, 2,139 or 8.25 percent, were found to have X-ray evidence consistent with pulmonary tuberculosis (table 2).

It should be pointed out that these findings were based entirely on the X-ray appearance of the lesions and are subject to revision as a result of subsequent serial X-ray examination, clinical and laboratory investigation. However, the writer shares Birkelo's opinion (*10*) that the Roentgen characteristics of tuberculous lesions are well enough established that practical dependence can be placed upon them.

The total of 2,139 cases of reinfection or adult-type pulmonary tuberculosis discovered represents previously unsuspected cases, inactive as well as active, but does not include calcified primary lesions, pleural effusions, or pleural thickening. The prevalence in individual hospitals varies considerably, ranging from 4.06 to 13.3 percent.

Table 2.—*Prevalence of previously unrecognized pulmonary tuberculosis in seven mental hospitals, found by X-ray survey; California, 1946*

Hospital	Number X-rayed	Cases	Percent
Agnews	3, 660	373	10. 2
Camarillo	4, 761	312	6. 6
Mendocino	3, 072	408	13. 3
Napa	3, 594	216	6. 0
Norwalk	2, 472	175	7. 1
Patton	3, 960	161	4. 06
Stockton	4, 395	494	11. 2
Total	25, 914	2, 139	8. 25

The variation in prevalence of tuberculosis in various mental hospitals may be affected by such factors as the age of patients at time of admission, length of residence, prevalence of tuberculosis among admitted patients, rate of transfer of tuberculosis cases to other hospitals, and rates of parole or discharge. Another highly important factor is the efficiency of the case-finding methods in use. One means of measuring case-finding activity is the ratio of cases discovered and reported during a given period to deaths from tuberculosis during the same period. This ratio was studied in five mental hospitals. Patton and Napa Hospitals were not included because recognized active tuberculosis cases had been transferred to those hospitals and the consequent tuberculosis death rate was disproportionately high. The period of study was 1941–43, previous to the surveys.

It was found that if the five hospitals were arranged in the order of their efficiency in case finding, as measured by the case-death ratio, the prevalences in the initial surveys assumed an inverse order (figure 1). In other words, the hospitals where case finding was more active before the survey, furnished the smaller number of cases remaining to be discovered by the X-ray.

A fact that unquestionably has a vital influence in the findings in figure 1 for Camarillo State Hospital, should be noted. This hospital is the only one of the five listed that had a qualified tuberculosis specialist on the staff during this period.

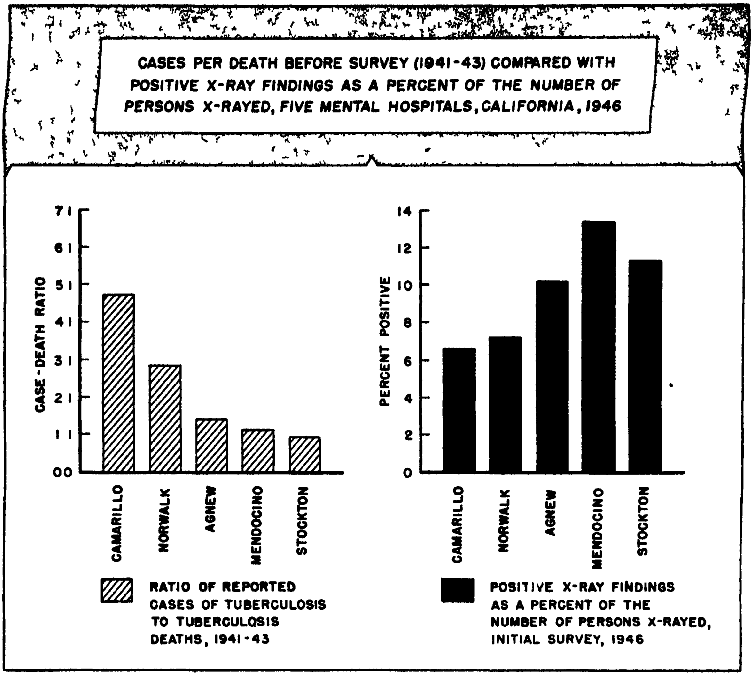

FIGURE 1

Effect of Length of Residence

The finding of more than 8 percent of mental patients with X-ray evidence of tuberculosis is similar to results in mental hospital surveys elsewhere (*11–22*), and without doubt this high prevalence grows out of two factors: (1) the introduction of tuberculosis patients into the hospital population without preliminary chest X-ray examination and without segregation, and (2) the consequent spread of the disease to others through intimate contact in an overcrowded resident population. Information regarding prevalence at the time of admission is lacking, but analysis of the data for length of residence in one hospital (table 3) throws some light on this question. Of 4,832 patients surveyed, 622 had been residents for a maximum of only 6 months and the prevalence in this group (1.6 percent) can be considered essentially the prevalence on admission. This prevalence is higher than in most general population surveys but is about the same as that found in general hospital admissions.

With increasing length of residence the picture changes strikingly and progressively. While 72 percent of all patients had been resident 2 years or more, 94 percent of the 307 tuberculous patients had been resident in the hospital for this length of time. The prevalence of tuberculosis in the group resident for 5 years or more was 8.8 percent, in contrast with 3.0 percent among those resident less than 5 years.

Table 3.—*Prevalence of previously unrecognized pulmonary tuberculosis in mental patients of one institution found by X-ray survey, by length of residence; California, 1946*

Length of residence	Total X-rayed	Cases found	Percent
6 months or less	622	10	1. 6
7–11 months	259	5	1. 9
1 year	457	12	2. 6
2–4 years	675	33	4. 9
5–9 years	1, 194	102	8. 5
10–14 years	702	54	7. 7
15 years and over	923	91	9. 9
Total	4, 832	307	6. 3

Effect of Mental Condition

It has been stated, often categorically, that patients with dementia praecox acquire tuberculosis in greater numbers and are more susceptible to the disease than others. This question was studied in a group of 4,832 patients and it was found (table 4) that among 2,784 dementia praecox patients the prevalence (7.5 percent) was higher than among the 2,048 other patients (4.8 percent). Further analysis of these two groups, however, for length of residence, showed that a higher proportion of dementia praecox patients were resident over long periods of time, with consequent greater opportunity to acquire tuberculosis. Of 209 dementia praecox patients with tuberculosis, 96 percent had been resident for more than 2 years as compared to 80 percent of 98 tuberculous patients with other mental conditions.

The prevalence of tuberculosis, based on X-ray evidence, increased progressively with increase in length of residence. With the present data, however, a statistically significant difference exists in those resident 15 years or more which would indicate relatively greater prevalence among dementia praecox cases. It is unfortunate that those resident 15 years or more were not broken down into further 5-year periods. This might have shown a materially different distribution of the tuberculous in the two groups of dementia praecox cases and those with other mental conditions, with consequently a different emphasis on the relative importance of residence and mental diagnosis.

Table 4.—*Prevalence of previously unrecognized pulmonary tuberculosis in dementia praecox mental patients and in all other mental patients in one mental hospital, by length of residence; California, 1946*

Length of residence	Patients given X-ray examination										
	All diagnoses			Dementia praecox				Diagnosis other than dementia praecox			
	Total number	With tuberculosis		Total		With tuberculosis		Total		With tuberculosis	
		Number	Percent	Number	Percent distribution by length of residence	Number	Percent	Number	Percent distribution by length of residence	Number	Percent
6 months	622	10	1.6	201	7.2	1	0.5	421	20.6	9	2.1
7–11 months	259	5	1.9	109	3.9	2	1.8	150	7.3	3	2.0
12–23 months	457	12	2.6	180	6.5	5	2.8	277	13.5	7	2.5
2–4 years	675	33	4.9	333	12.0	19	5.6	342	16.7	14	4.1
5–9 years	1,194	102	8.6	729	26.2	63	8.7	465	22.7	39	8.4
10–14 years	702	54	7.7	491	17.6	40	8.1	211	10.3	14	6.6
15 years and over	923	91	9.9	741	26.6	79	10.6	182	8.9	12	6.6
Total	4,832	307	6.3	2,784	100.0	209	7.5	2,048	100.0	98	4.8

Classification of Disease

Over half the cases discovered were in the minimal stage (table 5), in contrast to about 20 percent minimal cases among those discovered before the survey as a result of clinical symptoms.

Table 5.—*Classification of previously unrecognized cases of pulmonary tuberculosis found by X-ray survey in seven mental hospitals, by hospital and stage of disease; California, 1946*

Hospital	Total cases	Minimal		Moderately advanced		Far advanced	
		Number	Percent	Number	Percent	Number	Percent
Agnews	373	227	60	121	32	25	8
Camarillo	312	158	50	124	40	30	10
Mendocino	408	226	55	150	37	32	8
Napa	216	137	63	70	32	9	5
Norwalk	175	89	51	67	38	19	11
Patton	161	89	55	58	36	14	9
Stockton	494	246	50	182	37	66	13
Total	2,139	1,172	55	772	36	195	9

There were fewer minimal cases and more far-advanced cases than are usually found in surveys of industrial groups or in the general population. The relatively greater proportion of far-advanced cases in this group of patients carries a grave epidemiological significance for other patients, the employees who care for them without knowledge of their pulmonary disease, and, in the case of those paroled or discharged, relatives and other contacts. The public health implications are emphasized when we examine the data regarding cavitation (table 6).

One-seventh of the newly discovered cases *showed evidence of cavitation* on the 14″ x 17″ film and another 5 percent had evidence which was suspicious of cavity. Among the far advanced cases, 71 percent had cavity. *The 304 cavity cases represent more than 1 percent of the entire resident population of the hospitals.*

Table 6.—*Presence of cavitation in cases of pulmonary tuberculosis found by X-ray survey in mental hospitals, California, 1946*

Status regarding cavity	Number	Percent
Definite cavity	304	14
Suspected cavity	108	5
No cavity	1, 727	81
Total	2, 139	100

Estimate of Activity of Tuberculosis

Estimating the activity of tuberculous lesions in mentally ill patients presents much greater difficulty than in normal individuals. Sputum is rarely expectorated. Mental patients with extensive cavitation will progress to death with little or no cough or expectoration. Gastric lavage can be done only where personnel is available, and then with difficulty. Symptoms, naturally, are quite often suppressed. It is well known that tuberculous activity may persist long after body temperature becomes normal. These difficulties make it necessary to lean heavily on the information supplied by X-ray. Serial X-ray examination thus is a much more important aid in determining activity in mental patients than in normal individuals.

In order to assist the hospital staff in segregating patients as rapidly as possible an estimate of probable activity was made on the initial 14″ x 17″ X-ray film. Admittedly, under ordinary circumstances this procedure might be open to criticism and is subject to error but it seems the best way to secure rapid segregation. Serial X-ray examination and clinical investigation by sputum studies should be used to confirm or disprove the initial X-ray estimate of activity, and were so used in the mental hospitals.

Table 7.—*Estimate of activity in cases of pulmonary tuberculosis found by X-ray survey in mental hospitals in California, 1946*

Activity	Number	Percent
Probably active	1, 039	49
Questionably active	637	30
Probably inactive	463	21
Total	2, 139	100

Of the 2,139 cases for whom this information is available, practically half had lesions that were judged to be probably active (table 7). Another 30 percent presented lesions which could not be called active but which nevertheless required treatment or supervision.

Segregation

It appears clear that the cause of the high prevalence of tuberculosis in mental hospitals is failure to recognize or seek out cases of tuberculosis among incoming patients who then transmit the disease to other patients during residence in the hospital. The situation can be improved only by segregating and treating the tuberculous patients discovered by survey.

The recommendation for segregation was based on individual X-ray findings and included all except those whose lesions were judged to be inactive. It is recognized that patients without cavity and with infiltration in an intermediate stage between soft and fibrotic, may not endanger other patients by contact with them. If shortage of personnel, however, prevents following a patient closely by frequent X-rays and laboratory study, such a case may break down and become a new focus of infection, particularly among patients who cannot be depended upon to report new symptoms to their doctor.

Some years before the surveys, a policy was established whereby Napa State Hospital in the central part of the State and Patton State Hospital in the south, were designated as centers where tuberculous mentally ill patients were to be segregated and treated. These special facilities were soon filled with tuberculous patients, however, and further transfers were few. Consequently, when additional large numbers of tuberculous patients were discovered by survey, the hospital superintendents were faced with the tremendously difficult administrative problem of reshuffling their resident patients within the greatly overcrowded quarters at their command. There were also the usual requirements to be met for separating the patients according to their varying mental conditions. Considering these factors, the hospitals have complied satisfactorily in segregating their tuberculous residents. But because of lack of facilities it was not possible to segregate all of the tuberculous patients discovered by survey. Those whose tuberculosis was in a frankly communicable state were segregated. Of the group of patients whose disease appeared not to have reached an inactive, stable state, and who might therefore be potentially communicable, only part could be segregated. All of those considered to have stable, arrested lesions were left on nontuberculous wards but were checked periodically by X-ray.

A modified communicable disease technique is followed in the nursing care of the patients segregated. Many of the hospitals are not yet in a position to provide active therapy because of lack of personnel; however, there are now several hospitals with full-time tuberculosis specialists on the staff, and other personnel, such as X-ray and laboratory technicians, are being increased in numbers. Efforts are being made to get a tuberculosis specialist for each hospital.

To meet the problem of exposure of relatives and others after parole or discharge, the Department of Mental Hygiene adopted the policy of placing restrictions upon tuberculous patients leaving the hospital. Leave of absence is not granted to patients with active tuberculosis; patients with questionably active disease are granted leave only in case of emergency. Long-term parole or discharge of all tuberculous patients is permitted only when satisfactory arrangements have been made for care, preferably in a sanatorium if the disease is active. The Health Officer of the home jurisdiction is notified of all discharges of tuberculous cases.

Institutions for Mental Defectives

Two institutions are maintained in California for the care and treatment of mental defectives, epileptics, and a small number of patients committed as psychopathic delinquents. Pacific Colony receives patients from the southern part of the State and Sonoma State Home from the rest of the State.

Table 8.—*Prevalence of previously unrecognized pulmonary tuberculosis in patients of institutions for mental defectives, found by X-ray surveys, California*

Institution	Date of survey	Number X-rayed	Cases	Percent
Pacific Colony	1946	1, 654	15	0. 9
Sonoma	1944	3, 144	42	1. 3
Total		4, 798	57	1. 2

The death rate from tuberculosis among the mental defectives was not much more than half that for mentally ill patients (table 1). However, a program of annual X-ray examination for patients and employees, similar to that in mental hospitals, was carried out.

The prevalence of previously unrecognized reinfection or adult-type pulmonary tuberculosis among mental defective patients was found to be very much lower than among the mentally ill patients. Among 4,798 patients X-rayed, 57 (1.2 percent) cases were discovered (table 8). In addition to the 57 cases of reinfection-type disease, there were 10 cases of active primary (or childhood type) tuberculosis. This relatively low prevalence of 1.2 percent, as compared with 8.25 percent among the mentally ill, probably is due chiefly to the age at which residents are admitted. The median age on admission to institutions for mental defectives in 1944–45 was 15.2, while the median age of patients admitted to mental hospitals in the same year was 45 years. The primary sources of tuberculosis in any institutional survey are the unrecognized cases of active tuberculosis admitted to the hospital. Young persons, when admitted, have a much lower prevalence of the disease. Thus, with fewer source cases, there is less transmission of the disease during residence in these institutions than in the mental hospitals. Thirty (53 percent) of the newly discovered cases were minimal and four (7 percent) far advanced (table 9), essentially the same distribution as for the mentally ill (table 5). Segregation has been carried out in these institutions as in the mental hospitals. At Sonoma State Home, active treatment with phrenic paralysis, pneumothorax, and pneumoperitoneum is being carried out.

Table 9.—*Classification of cases of pulmonary tuberculosis found by X-ray survey in two institutions for mental defectives, by hospital and stage of disease, California*

Institution	Total cases	Minimal		Moderately advanced		Far advanced	
		Number	Percent	Number	Percent	Number	Percent
Pacific Colony	15	5	33	8	54	2	13
Sonoma State Home	42	25	60	15	36	2	4
Total	57	30	53	23	40	4	7

Employees

It has been emphasized repeatedly that hospital employees, particularly nurses and attendants, run a higher risk of acquiring tuberculosis than others. In mental hospitals where the incidence of tuberculosis is several times that in general hospitals, the risk is even greater. Reports from other States show that from one to four percent of mental-institution employees contract the disease. In addition to the personal problems created by the transmission of the disease to personnel, the cost to society is considerable. The New York State Insurance Fund spent nearly $8,000 (*16*) per case for the medical care of 120 employees who acquired the disease caring for patients in mental hospitals. In California, an average of nearly $4,000, has been spent for each of 35 State employees during the past 9 years (*23*). Every effort was made, therefore, to X-ray as large a proportion of the employees of each hospital as possible. The response was very good. The results are comparable to those found in other States. Of 3,321 employees X-rayed in mental hospitals, 90 (2.7 percent) had evidence of reinfection tuberculosis (table 10). Prevalence of tuberculosis among employees working in institutions for mental defectives (1.4 percent) is less than in mental hospitals, as might be expected.

Table 10.—*Prevalence of pulmonary tuberculosis among employees of mental hospitals and institutions for mental defectives, found by X-ray survey, California, 1946*

Hospital	Number X-rayed	Cases found	Percent
Agnews	438	14	3. 2
Camarillo	565	6	1. 1
Mendocino	335	13	3. 9
Napa	699	9	1. 29
Norwalk	402	15	3. 7
Patton	517	5	. 97
Stockton	526	23	4. 4
Total	3, 482	85	2. 4
Institutions for mental defectives:			
Pacific Colony	213	2	. 9
Sonoma	211	4	1. 9
Total	424	6	1. 4

There is a well-defined relationship in prevalence of tuberculosis between patients and employees in each of the seven mental hospitals. In the hospitals showing higher prevalence among patients, there is also a higher prevalence among employees (table 11).

Table 11.—*Comparison of prevalence of pulmonary tuberculosis among patients and employees of mental hospitals as found in X-ray survey; California, 1946*

Hospital	Prevalence among patients (Percent)	Prevalence among employees (Percent)
Napa	6. 0	1. 29
Camarillo	6. 6	1. 1
Patton	4. 06	. 97
Norwalk	7. 1	3. 7
Agnews	10. 2	3. 2
Stockton	11. 2	4. 4
Mendocino	13. 3	3. 9

Conclusions

1. A tuberculosis death rate of over 600 per 100,000 resident population, in 7 California hospitals for the mentally ill, and a death rate of nearly 400 per 100,000 resident population in 2 institutions for mental defectives, indicated the same need in California as in other States for an effective program of case finding and tuberculosis control.

2. A cooperative program, formulated by the Departments of Mental Hygiene and Public Health in 1943, was initiated in 1944 with preliminary mass X-ray surveys of patients and employees. The program was placed on a continuing basis in 1946.

3. A prevalence of 8.25 percent of previously unsuspected reinfection-type pulmonary tuberculosis was discovered among 25,914 patients in 7 mental hospitals.

4. Prevalence of tuberculosis was higher among patients with dementia praecox than among those with other mental conditions. This is probably because patients with dementia praecox stay in the hospital longer and therefore have greater opportunity for exposure; however, there is statistically significant evidence that the mental state is a factor, although definitely a minor one, in the high prevalence among the mentally ill.

5. A program of segregation was put into effect. All patients with active pulmonary disease were segregated; also, some of the patients with questionably active or potentially communicable disease. Patients with inactive disease were left on nontuberculous wards but checked periodically by X-ray.

6. Among employees of mental hospitals, there was a prevalence of 2.7 percent pulmonary tuberculosis.

7. The prevalence of reinfection-type pulmonary tuberculosis in two institutions for mental defectives was 1.2 percent, much lower than among mental patients. This difference is attributed to the younger age at which mental defectives are admitted.

8. Among employees in institutions for mental defectives the prevalence was 1.4 percent.

9. In order to improve conditions in mental institutions, it is necessary to do a thorough X-ray survey of all patients, to X-ray all new admittances, and to segregate all patients with communicable tuberculosis. Such surveys must be repeated annually for a considerable period of time.

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Tuberculin, Coccidioidin, and Histoplasmin Sensitivity in Relation to Pulmonary Calcifications

A Survey Among 6,000 Students at the University of Chicago [1]

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Since 1942, the association of coccidioidin and histoplasmin sensitivity with pulmonary calcification (*1, 2, 3, 4*) has introduced new emphasis to the evaluation of such calcifications. The high prevalence of pulmonary calcifications in the Middle West (*5*), and the high prevalence of histoplasmin sensitivity in the same general region (*6, 7*) have suggested a need for re-assessing the etiology of these calcifications. In view of the evidence that histoplasmosis and coccidioidomycosis may be etiologically associated with pulmonary calcification, these antigens were included among the skin tests given as part of the tuberculosis control program at the University of Chicago.

This procedure also provided a means of estimating the prevalence of coccidioidin and histoplasmin sensitivity among persons from areas which have not yet been extensively surveyed (*6*). Because of the wide area from which they are drawn, the students at the University of Chicago are a convient source of information on the geographical variations of the incidence of histoplasmin, coccidioidin, and tuberculin sensitivity in relation to pulmonary calcification and chest diseases. Only 30 percent of the 9,000 students enrolled come from Chicago and vicinity; the greater number are drawn from practically all parts of the United States, and several hundred are from foreign countries.

Methods

The present report is based on the study of 6,000 students registered at the University from January 1 to October, 1947. The study was incorporated in a tuberculosis control program set up for about 9,000 students who were enrolled during this period. More than 6,300 persons were examined but because of incomplete or otherwise unsatisfactory records, about 300 were excluded from this analysis. The remaining 6,000 represent those examined routinely at the time of registration within the study period, others who reported to the clinic for various reasons during that time, and a third group who were solicited or who had heard about the program by other means and volunteered to become a part of the study group.

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[1] From the Department of Medicine, School of Medicine, and the Student Health Service, the University of Chicago. This investigation was supported (in part) by a research grant from the Division of Research Grants and Fellowships of the National Institute of Health, Public Health Service.

Each student reporting for examination was directed to fill out, under supervision, a questionnaire punch card. He was asked where he had lived and what places he had visited for periods of 6 months or longer, and what places he had visited for shorter periods of time. He was also asked what diseases he had had or had come in contact with. A systematic review was made of his past illnesses.

After completing the questionnaire, the student was given skin tests with tuberculin,[2] coccidioidin,[3] and histoplasmin,[4] administered intracutaneously in 0.1 cc. doses, each in particular areas of the forearms. Each set of syringes and needles was used for only a single antigen (*8,9*). The tuberculin used was 0.0001 mg. PPD (*10*); the coccidioidin (*2,9,11*) and histoplasmin (*12,3*) were 1–100 dilutions of sterile filtrates of broth cultures of the fungi, as recommended by the persons who provided the antigens. The student was instructed to report back for skin test interpretations in either 48 or 72 hours, whichever was convenient. At that time the diameters of both the erythema and the induration of the reactions were measured (*13*). Both the injections and the readings of the skin tests were done by one of three persons.

After the injections of the skin test antigens, the student was sent to the microfilm room for chest X-ray. A single film chest X-ray was taken on a Picker 70 mm. Minograph machine and exposures were timed automatically with a Hodges-Morgan type of photo-electric timer. The films were read by one of the authors (Lack) on a General Electric fluorescent viewer, without knowledge of skin test reactions, for the purpose of determining the presence or absence of calcification. This information, together with a description of any other significant chest disease or extra-pulmonary lesion, was recorded on the punch card.

A skin reaction was considered positive if the induration measured 5 mm. or more in diameter, regardless of erythema. A doubtful reaction was defined as one showing 1 to 4 mm. of induration, regardless of erythema. Doubtful tuberculin reactions occurred in 1.4 percent of the total group, doubtful coccidioidin reactions in 0.6 percent, and doubtful histoplasmin reactions in 1.4 percent. These doubtful reactions were considered negative in the analysis that follows (*6*).

Ten percent of the films showing pulmonary calcifications were interpreted as doubtful. These, however, were included with the definite calcifications in accordance with the analyses of others (*4,14*).

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[2] Supplied by Sharpe & Dohme, Philadelphia, Pa

[3] Supplied by Dr Charles H Smith, Stanford University School of Medicine, Palo Alto, Calif.

[4] Supplied by Drs Amos Christie & J. C. Peterson, Vanderbilt University, Nashville, Tenn.

Results

Prevalence of sensitivity.—The age and sex distribution of the study population is given in table 1. Approximately 55 percent of the entire group were below age 25; 25 percent were in the 25- to 29-year group, and approximately 10 percent, 5 percent, and 2½ percent, respectively, fell in the older age groups. In the 20–34 year age groups, the males outnumber the females approximately three to one, while the females predominate in the oldest year groups. Table 2 shows that the over-all prevalence of tuberculin sensitivity was 26.1 percent; of coccidioidin sensitivity, 4.1 percent; and of histoplasmin sensitivity, 20.2 percent. Of the 6,000 persons tested, 59.5 percent reacted to none of the three antigens.

Table 1.—*Distribution of study population by age and sex*

Age in years	Total		Male		Female	
	Number	Percent	Number	Percent	Number	Percent
15–19	1,156	19.3	690	59.7	466	40.3
20–24	2,137	35.6	1,565	73.2	572	26.8
25–29	1,503	25.1	1,198	79.7	305	20.3
30–34	615	10.2	454	73.8	161	26.2
35–39	284	4.7	152	53.5	132	46.5
40–44	155	2.6	63	40.6	92	59.4
45 and over	150	2.5	45	30.0	105	70.0
All ages	6,000	100.0	4,167	69.5	1,833	30.5

Table 2. *Prevalence (percent) of tuberculin, coccidioidin, and histoplasmin sensitivity among 6,000 students by sex and age*

Age in years	Tuberculin		Histoplasmin		Coccidioidin		Nonreactors	
	Male	Female	Male	Female	Male	Female	Male	Female
15–19	11.0	7.9	11.0	9.0	2.2	1.3	79.1	83.7
20–24	20.4	17.1	19.7	13.1	3.9	1.6	63.4	72.4
25–29	29.6	31.8	25.0	20.0	6.0	4.9	52.2	53.8
30–34	45.6	42.9	28.2	23.6	6.2	2.5	38.1	41.6
35–39	56.6	40.9	32.2	22.7	10.5	.8	25.0	45.5
40–44	60.3	54.4	44.4	32.6	1.6	5.4	20.6	32.6
45 and over	64.4	46.7	51.1	24.7	11.1	8.6	24.4	40.9
All ages	26.1		20.2		4.1		59.5	

The prevalence of sensitivity to the three antigens in relation to age is shown in figure 1. In general, the prevalence of sensitivity to all antigens appears to increase stepwise with age. The oldest age group (45 years and older) does not shown an increase for tuberculin or histoplasmin. This departure from the trend is accounted for by the low prevalence of sensitivity among females in this age group and the fact that the number of females is disproportionately large.

Prevalence in relation to sex.—In table 1, the number of males was seen to be approximately three times the number of females in groups

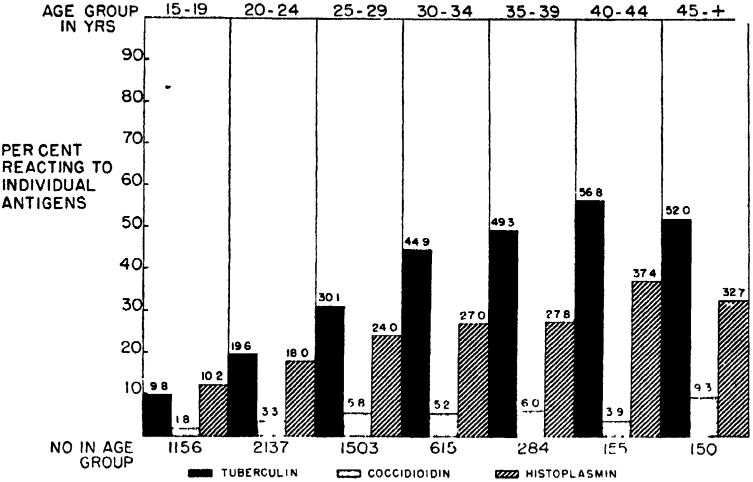

Figure 1. Prevalence of tuberculin, coccidioidin, and histoplasmin sensitivity in relation to age among 6,000 students.

from 20 to 34 years. A slight but consistently higher prevalence of sensistivity to the three antigens was found among males in all age groups (table 2) except those in the age group 25–29 for tuberculin, and those in the group 40–44 for coccidioidin. However, the differerences between males and females in these last two groups are not significant.

Prevalence of sensitivity to one or more antigens.—Groups of reactors were analyzed according to whether they reacted to a single antigen or to combinations of antigens. Table 3 gives the prevalence of the reactions by age. The percentage of reactors to tuberculin alone showed a stepwise increase with age to approximately the 40-year level, but the percentage reacting to histoplasmin alone did not

Table 3.—***Prevalence of tuberculin and histoplasmin reactions and their combinations among 6.000 students by age***

Age in years	Tuberculin		Tuberculin and histoplasmin		Histoplasmin		Nonreactors	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
15–19	91	7.9	18	1.6	90	7.8	936	80.9
20–24	332	15.5	69	3.2	259	12.1	1,407	65.8
25–29	333	22.2	90	6.0	204	13.6	789	52.5
30–34	201	32.7	61	9.9	81	13.2	240	39.0
35–39	102	35.9	32	11.3	35	12.3	98	34.5
40–44	53	34.2	31	20.0	22	14.2	43	27.8
45–49	17	21.8	11	14.1	9	11.4	31	39.7
50 and over	25	34.7	16	22.2	4	5.6	23	31.9
All ages	1,154	19.2	328	5.5	704	11.7	3,567	59.5

NOTE: The above table accounts for 95.9 percent of the students tested. The remaining 4.1 percent comprise: 27 tuberculin-coccidioidin reactors (0.5 percent), 56 tuberculin-coccidioidin-histoplasmin reactors (0.9 percent), 37 coccidioidin reactors (0.6 percent), and 127 coccidioidin-histoplasmin reactors (2.1 percent).

continue to increase appreciably after age 29. The percentage of the total group that reacted to both tuberculin and histoplasmin, however, increases rapidly to the 44-year level. This probably explains the increase of the total histoplasmin sensitivity by age which was noted in table 2.

Prevalence of sensitivity in relation to pulmonary calcifications.—The individuals who reacted to each antigen, to combinations of the antigens, and nonreactors were studied to determine the relationship to pulmonary calcification. The prevalence of calcification in each of the seven reacting groups and the nonreacting group is shown in table 4. The over-all prevalence was 13.3 percent. The histoplasmin reactors showed 29 percent with calcification, double that of the tuberculin reactors (14 percent); while the coccidioidin reactors were intermediate in position (19 percent). The calcification rate recorded for coccidioidin reactors is not reliable, however, because of the small number reacting to coccidioidin. The group reacting to both tuberculin and histoplasmin showed a calcification rate (28.4 percent) approximately the same as the group reacting to histoplasmin alone. The highest rate of calcification was encountered among those reacting to all three antigens, 21 of 56 persons, or 37.5 percent. However, due to the small size of the group, this rate of calcification is significantly different only from the rate among the tuberculin reactors (14 percent) alone. The prevalence of pulmonary calcifications among the nonreactors was 7.5 percent.

Table 4.—*Prevalence of calcification and sensitivity to individual antigens and to combinations of antigens*

Antigens	Reactions among 6,000		With calcification		Percent reactors among 800 with calcification
	Number	Percent	Number	Percent	
Tuberculin	1,154	19.2	162	14.0	20.3
Tuberculin-coccidioidin	27	.5	5	18.5	.6
Tuberculin-histoplasmin	328	5.5	93	28.4	11.6
Tuberculin-coccidioidin-histoplasmin	56	.9	21	37.5	2.6
Coccidioidin	37	.6	7	18.9	.9
Coccidioidin-histoplasmin	127	2.1	38	29.9	4.8
Histoplasmin	704	11.7	205	29.1	25.6
Non-reactors	3,567	59.5	269	7.5	33.6
Total	6,000	100.0	800	13.3	100.0

Table 4 also gives the proportional distribution of the 800 students who showed pulmonary calcifications by skin sensitivity groups. Of those showing calcification, 26 percent reacted to histoplasmin, 20 percent to tuberculin, 12 percent to both tuberculin and histoplasmin, 5 percent to both coccidioidin and histoplasmin, and the remaining 4.0 percent reacted to coccidioidin alone or in combination with tuberculin or to all three antigens. Approximately one-third of those showing pulmonary calcifications, however, reacted to none of the three antigens. It will be noted from figure 2 that the prevalence of pulmonary calcification in nonreactors almost doubles from the youngest to the oldest age group under study.

The relation of age to the prevalence of pulmonary calcifications.—The prevalence of calcification in relation to age was examined among the major reacting groups and is illustrated graphically in figure 2. The largest variation in prevalence of calcification among tuberculin reactors was from the 15–19 year age group to the 20–24 year age group; 7.7 percent to 13.0 percent respectively. While the variation by age is not as remarkable in the older groups, nevertheless there seems to be a gradual and somewhat irregular increase in prevalence of calcification among tuberculin reactors with increasing age, with the highest prevalence shown in the oldest group. The calcification rate among those reacting to histoplasmin alone was high in the youngest group (36.7 percent) and more than double the rate observed among those reacting to both tuberculin and histoplasmin, although the

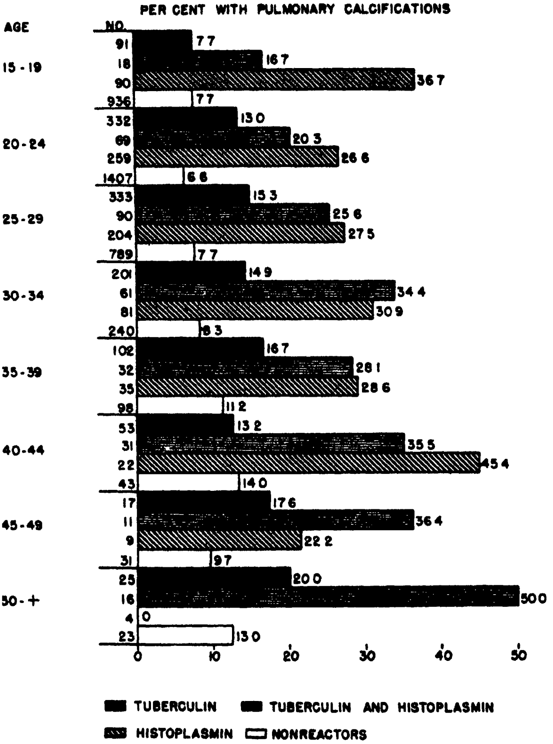

Figure 2. Prevalence of pulmonary calcifications in relation to age among the major reacting groups and among nonreactors from a survey of 6,000 students (see table 3).

latter group is unreliable as a sample because it contains only 18 persons. There seemed to be a tendency, where the groups were large enough for comparison, toward a lower prevalence of calcification among reactors to both tuberculin and histoplasmin than among reactors to histoplasmin alone. The nonreactors consistently showed the lowest rate of calcifications except in a few groups where the differences are not significant.

Geographical variations in prevalence of tuberculin and coccidioidin sensitivity.—An attempt was made to determine all the places in which a student had lived and traveled and the duration of his stay in each. From this information, an approximation of the time spent in any given locality was reached according to a variation of the method used by Palmer (*6*). For purposes of this analysis, a student who spent 50 percent or more of his life in one State or one foreign country was considered to be "from" or a "life-time resident" of that State or country. The 6,000 individuals studied were thus classified geographically with the exception of 285 persons who had spent less than 50 percent of their lives in any one State or country. This latter group was labelled "wanderers" and treated as though it constituted a single geographic unit. The geographical distribution of the students varied widely, as is seen in table 5. They ranged in number from 132 in the Mountain States region to 2,821 in the East North Central States, although the samples from 30 individual States contained less than 50 persons. In addition, there were 472 foreign students.

Table 5.—*Prevalence of sensitivity to each antigen and of calcification by geographic area*

Region or area	Number tested	Tuberculin		Histoplasmin		Coccidioidin		With calcification	
		Number	Percent	Number	Percent	Number	Percent	Number	Percent
United States:									
East North Central	2,821	593	21.0	594	21.1	117	4.1	374	13.3
Middle Atlantic	714	186	26.1	67	9.4	18	2.5	65	9.1
West North Central	538	119	22.1	187	34.8	25	4.6	103	19.1
South Atlantic	281	83	29.5	58	20.6	9	3.2	36	12.8
New England	205	71	34.6	15	7.3	0	0.0	12	5.9
Pacific	205	40	19.5	23	11.2	14	6.8	18	8.8
West South Central	203	50	24.6	76	37.4	16	7.9	31	15.3
East South Central	144	41	28.5	76	52.8	11	7.6	29	20.1
Mountain	132	30	22.7	8	6.1	12	9.1	10	7.6
Wanderers	285	92	32.3	77	27.0	16	5.6	57	20.0
Total U. S.	5,528	1,305	23.6	1,181	21.4	238	4.3	735	13.3
Europe	164	92	56.1	9	5.5	4	2.4	19	11.6
Canada and Alaska	110	37	33.6	8	7.3	4	3.6	11	10.0
China	57	55	96.6	1	1.8	0	0.0	15	26.3
Asia except China	33	17	51.5	1	3.0	0	0.0	8	24.2
Other foreign	108	59	54.6	15	13.9	1	0.9	13	12.0
Total foreign	472	260	55.1	34	7.2	9	1.9	66	14.0

The prevalence of tuberculin sensitivity throughout the several regions of the United States varied from 19.5 percent to 34.6 percent. When the States were studied separately, insofar as the size of the samples permitted, there seemed to be no tendency for the States of either high or low prevalence to predominate in one section of the country. Examination of the rates by sex showed as many States with higher prevalence among females as among males. The rate for the "wanderers" (32 percent) was slightly below the highest prevalence noted in any section of the country.

Table 6.—*Coccidioidin sensitivity among 5,243*[1] *students from certain regions*[2] *of the United States, by sex*

Region	Males			Females		
	Number			Number		
	Tested	Positive	Percent positive	Tested	Positive	Percent positive
I	55	4	7.3	21	0	0
II	35	0	0	20	0	0
III	345	18	5.2	165	1	.6
IV	170	19	11.2	76	8	10.5
V	2,145	111	5.2	940	35	3.7
VI	191	8	4.2	102	0	0
VII	256	0	0	114	0	0
VIII	449	17	3.8	160	1	.6

[1] Residents of United States.
[2] See figure 3.

The prevalence among foreign students was significantly higher than among Americans—55.1 as opposed to 23.6 percent. Eighty percent of students from Asia reacted to tuberculin, among whom those from China (57 persons) showed a rate of 96.6 percent. The rate for stu-

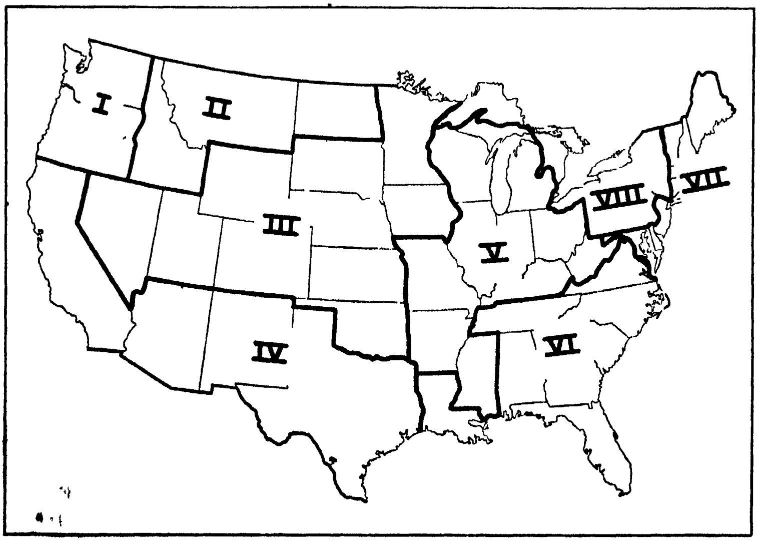

Figure 3.

dents from Europe was 56.1 percent, and the rate for those from Canada and Alaska was 33.6 percent, which is very near that of the New England States.

The pattern for the geographic distribution of the prevalence of coccidioidin sensitivity is not clear cut. From the rates obtained in several sections of the country, it seems probable that the picture is complicated by the occurrence of a cross reaction between the two fungus antigens employed (histoplasmin and coccidioidin). It may be that the strength of these antigens was too great. In general, two areas seem higher than the average, one in the Southwest and one in the Midwest and Midsouth, the latter being the region of highest histoplasmin sensitivity (table 6). Males showed a slightly higher rate of sensitivity than females throughout the United States, excepting the Southwest, where the rates were the same.

Geographical distribution of histoplasmin sensitivity.—In contrast to the scattered geographical variations in the prevalence of tuberculin sensitivity, the prevalence rates of histoplasmin sensitivity and of pulmonary calcifications showed a marked tendency to centralize in one section of the United States.

In appendix tables A and B, the prevalence rates of histoplasmin sensitivity and of pulmonary calcification are given for individual States where the sample comprised 20 persons or more. The geo-

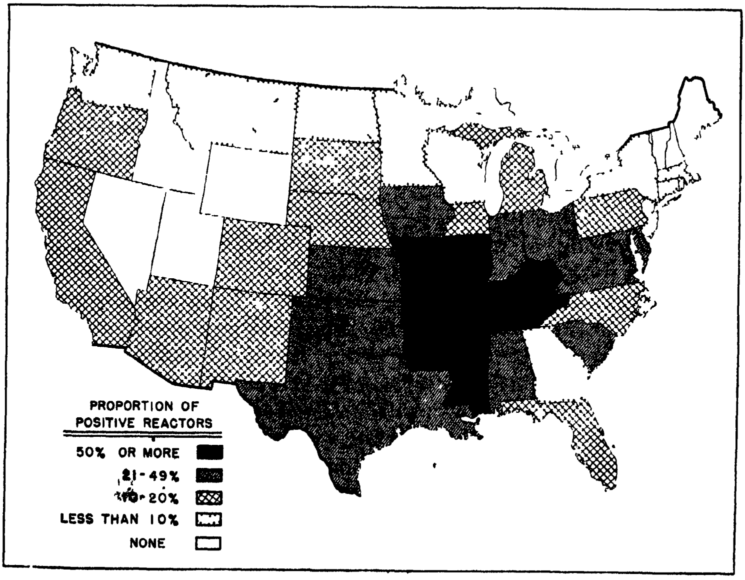

Figure 4. Histoplasmin sensitivity rates observed in University of Chicago students from certain States and groups of States, 1947

graphic distribution of the prevalence of histoplasmin sensitivity, using the data from appendix table A, is shown graphically in figure 4. It can be seen readily that the prevalence rates of histoplasmin sensitivity reveal an endemic region in the Lower Mississippi Basin.[5] The prevalence is considerably higher among the students from this region than among those coming from the Mountain States and New England, and appreciably higher than among those coming from contiguous regions. Those coming from Mississippi had the highest prevalence rate, 70 percent. However, only 20 students were tested from this State. The second highest rate (69.7) was observed in Missouri, where 132 students were tested. The rate of 7 percent histoplasmin sensitivity among the students coming from the relatively nonendemic areas was essentially the same as the average rate among the foreign students as a whole but was higher than among those coming from Asia (2.2 percent), who had the highest prevalence of tuberculin sensitivity.

An analysis of the data of appendix table A giving histoplasmin sensitivity according to sex showed the same general geographic distribution for each sex. A higher prevalence of histoplasmin reactors was found among males than among females in nearly all States, and, in the United States in general, males showed an unquestionably higher rate. On the other hand, there was not a significant difference in regional prevalence of tuberculin and coccidioidin sensitivity in relation to sex.

Geographical distribution of pulmonary calcifications.—The geographic distribution of the prevalence of pulmonary calcifications is shown in figure 5, by regions of similar calcification prevalence. The rate was highest among students coming from a region strikingly similar to the Lower Mississippi Basin. If the maps giving the geographic distribution of histoplasmin sensitivity and the geographic distribution of calcification are compared it can be seen that of the six States having the highest prevalence rates of histoplasmin sensitivity, five are among those States that show the highest prevalence rates of pulmonary calcification. Conversely, little calcification was noted in films of persons from regions of low histoplasmin sensitivity.

When broken down according to sex, the geographical distribution of prevalence rates retains the same general pattern for both males and females. The rates in most States were approximately the same for both sexes or slightly higher for the males. Four southeastern States, however, differed from this pattern by showing higher rates for females: Georgia, Florida, Alabama, and Mississippi.

One hundred thirty-five persons (2.25 percent) with active or questionably active noncalcified pulmonary infiltrates were detected among

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[5] The term, Lower Mississippi Basin, is used to include the general area drained by the Mississippi and Ohio Rivers but only the small lower portion of the area drained by the Missouri River. This, in general, is the area referred to by others as eastern central United States (*5, 6*).

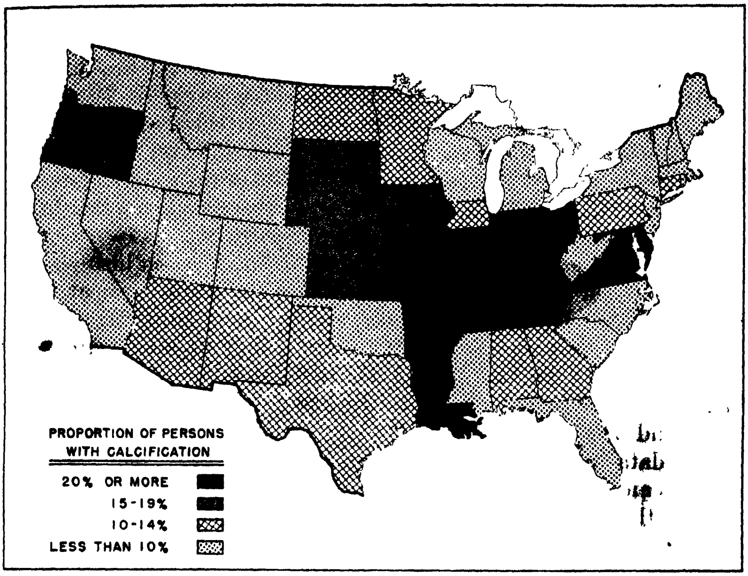

Figure 5. Pulmonary calcification rates observed in University of Chicago students from certain States and groups of States, 1947

the 6,000 students surveyed. An additional 102 persons (1.7 percent) were found with chest lesions other than infiltrations. These two groups are being followed and will be reported upon at a future date. In addition to these, 14 individuals with miliary pulmonary calcifications, and 13 individuals with unusually large hilar calcifications are being investigated at the present time and will be reported in detail later. A high percentage of those with such unusual calcifications have been reported to react to histoplasmin (*15, 16*). Among similar cases at Chicago, 85 percent were found to react to histoplasmin.

Discussion

The over-all prevalence of tuberculin sensitivity (26.1 percent) among the 6,000 students at the University of Chicago is comparable to the rate of sensitivity reported in other student population groups (*4, 7, 17, 18, 19, 20, 21*). The rate of pulmonary calcification among the tuberculin reactors was 14 percent, similar to the rate found by others (*1, 4, 14, 21*). Although there were scattered differences in the rate of pulmonary calcification among tuberculin reactors coming from different parts of the United States, it was by far the highest among Chinese males, 95 percent of whom reacted to tuberculin and showed a rate of 30.2 percent calcifications.

Four percent of the students reacted to coccidioidin. The highest rate of coccidioidin sensitivity (8–9 percent) was found not only in the southwest United States which was described by Smith (*2*) in 1943, as containing areas endemic for coccidioidomycosis, but also in three middle western States: Missouri, Kentucky, and Southern Illinois. Whether the high prevalence of coccidioidin sensitivity in these middle western States reveals a true rate of coccidioidal infection or whether it represents a cross sensitivity with histoplasmin, as suggested by Smith (*2*), remains to be proved.

Of greatest interest in the study were the findings on histoplasmin sensitivity and pulmonary calcifications. The prevalence of histoplasmin sensitivity among students aged 20–24 (18.0 percent) agrees with the nation-wide survey of Palmer among student nurses (*6*). The progressive increase of histoplasmin sensitivity with age agrees in general with the reports of Christie and Peterson (*7*) and Furcolow, High, and Allen (*14*).

The data derived from the geographical analysis of histoplasmin reactors among the students at the University of Chicago confirms in general the observations of Palmer (*6*). The prevalance of histoplasmin sensitivity is similar to that found among students from States where recent surveys of university students have been reported. Prior and Allen (*18*) reported an over-all prevalence of 47 percent among Ohio residents with a significantly lower prevalence in eastern Ohio. The rate found in this survey was 39 percent. Students at another Ohio university showed a prevalence of 36 percent histoplasmin sensitivity (*19*). A Pennsylvania survey (*20*) showed a prevalence of 11 percent as compared with 16 percent in this study. A survey of Wisconsin resident students (*21*) discovered 11 percent prevalence as against 8 percent found in this survey.

In general, our observations on the geographical distribution of the prevalence of pulmonary calcifications among the students agree with the findings of Long and Stearns of Army inductees which was limited to males (*5*). They found the highest prevalence in Tennessee (28 percent). In our study, the number of students from this State was small; however, 11 of 34 had pulmonary calcification. A significant difference was found between students from Northern and Southern Illinois, bearing out the findings of Long and Stearns (*5*). In our study, the prevalence of both histoplasmin and pulmonary calcifications in the students from Southern Illinois (56 and 31 percent respectively) was more than three times that among those from Northern Illinois and the Chicago vicinity (15 and 10 percent respectively). The rate of pulmonary calcifications among students who did not react to any of the three antigens (7.5 percent) is higher than that found in surveys of the United States as a whole (*4*), of Kansas

City (*14*), and of Wisconsin (*21*), but lower than the rates found in Tennessee (*7, 22*).

Questions concerning the specificity and dose of the antigens [6] employed in this study and the relationship between sensitivity to these antigens in the presence of pulmonary infiltrates and calcifications have been reviewed by others (*23, 3, 7, 24, 25, 26, 27*). Efforts are being made to isolate coccidioides, histoplasma, and the tubercle bacillus from patients having non-calcified infiltrates. More investigations such as those recently made by Furcolow et al. (*28*) and by Bunnell and Furcolow (*29*) are needed to clarify the nature of early infections leading to histoplasmin sensitivity. No reports on the isolation of *H capsulatum* from the soil have been noted but its recovery from dogs, rats and mice (*30*) suggests animals as a possible source.

Summary

In summary, this report confirms the results of other recent surveys. A population of diverse origin was studied at a central epidemiological station. It was found that (*a*) the prevalence of tuberculin sensitivity progressively increased from 10 percent among the youngest age group to 57 percent among those 50 years of age; (*b*) the rate of histoplasmin sensitivity began at 10 percent among the youngest group and reached 38 percent in the oldest group; (*c*) pulmonary calcifications were associated with histoplasmin sensitivity twice as frequently as they were with tuberculin sensitivity; (*d*) the prevalence of both histoplasmin sensitivity and pulmonary calcifications was highest in the Lower Mississippi Basin of the United States.

ACKNOWLEDGMENTS

The authors are deeply indebted to Mrs. Ruth Quinlan, R. N., and Mrs. Agnes Robertson, R. N., for their considerable assistance in administering and interpreting the skin tests, and to Miss Jeanne Friedemann for her careful work in verifying the accuracy of the data submitted by the students.

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APPENDIX A

Histoplasmin sensitivity observed in University of Chicago students from certain States and and groups of States, by sex, 1947

Geographic unit	Tested	Total pos	Rate	Males		Females	
				Tested	Pos	Tested	Pos
Mississippi	20	14	70.0	16	11	4	3
Missouri	132	92	69.7	104	77	28	15
Tennessee	34	23	67.6	22	16	12	7
Arkansas	29	19	65.5	21	15	8	4
Kentucky	50	29	58.0	34	23	16	6
Southern Illinois	116	65	56.0	74	46	42	19
Indiana	240	104	43.3	159	75	81	29
Kansas	75	31	41.3	51	25	24	6
Louisiana	30	12	40.0	20	8	10	4
Ohio	251	98	39.0	169	68	82	30
Oklahoma	44	15	34.1	36	12	8	3
Iowa	125	40	32.0	84	29	41	11
Maryland, Virginia, Delaware, and District of Columbia	86	27	31.4	47	19	39	8
West Virginia	33	10	30.3	21	6	12	4
Texas	100	30	30.0	71	24	29	6
Alabama	40	10	25.0	29	7	11	3
South Carolina	29	7	24.1	19	5	10	2
Michigan	163	27	16.6	119	23	44	4
Pennsylvania	161	26	16.1	112	22	49	4
South Dakota	31	5	16.1	18	4	13	1
Nebraska	57	9	15.8	39	5	18	4
Northern Illinois	1 926	290	15.1	1 337	211	589	79
Oregon	27	4	14.8	23	4	4	0
Florida	56	8	14.3	38	6	18	2
California and Arizona	141	17	12.1	95	12	46	5
Colorado and New Mexico	42	5	11.9	24	4	18	1
North Carolina	37	4	10.8	19	3	18	1
Massachusetts and Rhode Island	132	13	9.8	91	9	41	4
Montana and North Dakota	43	4	9.3	28	4	15	0
Minnesota	99	8	8.1	60	7	39	1
Wisconsin	125	10	8.0	91	9	34	1
New York	448	34	7.6	337	28	111	6
New Jersey	105	7	6.7	77	6	28	1
Washington	49	3	6.1	32	3	17	0
Georgia	40	2	5.0	29	1	11	1
Connecticut	54	2	3.7	42	2	12	0
Idaho Nevada Utah and Wyoming	54	0	0	44	0	10	0
Maine New Hampshire and Vermont	19	0	0	13	0	6	0
Total	5 243	1 104		3 645	829	1 598	275

PLAGUE INFECTION IN YAKIMA COUNTY, WASH.

Under date of December 14, plague infection was reported proved in Yakima County, Wash., in a pool of 162 fleas from 147 short-tailed meadow mice, *Lagurus curtatus*, trapped Dec. 1, 1948, on the firing range, 10 miles northeast of Yakima.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended November 27, 1948.—During the week ended November 27, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		41	1	244	474	114	151	124	245	1,394
Diphtheria				12	7	3	2	1		25
Dysentery, bacillary				1		1				2
German measles				12	11			2	12	37
Influenza		13			1	5				19
Measles		56	3	156	116	102	7	31	46	517
Meningitis, meningococcal			1		1				1	3
Mumps		6	7	37	175	66	22	20	18	351
Poliomyelitis				1	5	3	1	1	2	13
Scarlet fever				129	60	4	9	9	5	216
Tuberculosis (all forms)		4	3	53	30	35	3		19	147
Typhoid and paratyphoid fever				4			3			7
Undulant fever				4	1				1	6
Venereal diseases:										
Gonorrhea	1	13	12	125	97	23	21	61	69	422
Syphilis	3	6	16	60	52	6	3		19	165
Other forms									1	1
Whooping cough		5	18	99	38	1	8	2		171

JAMAICA

Notifiable diseases—4 weeks ended November 27, 1948.—For the 4 weeks ended November 27, 1948, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	2	Scarlet fever	1	1
Chickenpox	3	11	Tuberculosis (pulmonary)	39	56
Diphtheria	5	1	Typhoid fever	6	57
Erysipelas	1	1	Typhus fever (murine)		1

MADAGASCAR

Notifiable diseases—October 1948.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during October 1948 as follows:

Disease	October 1948			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis	-------	-------	163	0
Cérebrospinal meningitis	-------	-------	10	5
Diphtheria	3	0	-------	-------
Dysentery:				
Amebic	-------	-------	295	6
Bacillary	-------	-------	1	0
Encephalitis, infectious	-------	-------	1	0
Erysipelas	-------	-------	10	0
Influenza	32	0	3,022	26
Leprosy	-------	-------	32	0
Malaria	392	0	30,283	209
Measles	-------	-------	112	0
Mumps	2	0	106	0
Plague	-------	-------	13	12
Pneumonia, broncho	1	0	237	48
Pneumonia, pneumococcic	-------	-------	567	71
Puerperal infection	1	0	1	0
Trachoma	-------	-------	1	0
Tuberculosis, pulmonary	7	1	92	28
Typhoid fever	2	0	16	3
Whooping cough	-------	-------	123	1

NORWAY

*Notifiable diseases—July-September 1948.**—During the months of July, August, and September 1948, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases		
	July	August	September
Cerebrospinal meningitis	15	12	11
Diphtheria	28	30	56
Dysentery, unspecified	5	2	4
Encephalitis, epidemic	2	1	-------
Erysipelas	326	342	404
Gastroenteritis	4,198	4,629	3,587
Gonorrhea	402	453	407
Hepatitis, epidemic	101	111	152
Impetigo contagiosa	2,057	2,803	3,448
Influenza	1,099	1,400	2,331
Laryngitis	5,466	5,669	8,013
Malaria	1	-------	2
Measles	1,568	973	1,046
Mumps	723	473	384
Paratyphoid fever	3	-------	4
Pneumonia (all forms)	1,189	1,151	1,411
Poliomyelitis	58	128	122
Rheumatic fever	81	76	95
Scabies	1,428	2,187	2,635
Scarlet fever	153	197	481
Syphilis	86	84	119
Tetanus	1	-------	-------
Tuberculosis (all forms)	314	280	343
Typhoid fever	1	4	3
Weil's disease	1	1	3
Whooping cough	362	490	545

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*Report for June not received.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

Indochina (French)—Laos State.—During the week ended December 4, 1948, 1 case of plague was reported in Vientiane, Laos State, French Indochina.

Smallpox

Egypt—Alexandria.—During the week ended November 27, 1948, 3 cases of smallpox were reported in Alexandria, Egypt.

Iraq—Basra.—During the week ended December 4, 1948, 14 cases of smallpox with 1 death were reported in Basra, Iraq.

Typhus Fever

Germany (United States Zone).—During the week ended November 20, 1948, 3 cases of typhus fever (murine type) were reported in the Bremen area in the United States Zone of Germany.

DEATHS DURING WEEK ENDED DEC. 11, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Dec. 11, 1948	Corresponding week, 1947
Data for 92 large cities of the United States:		
Total deaths	9,386	9,894
Average for 3 prior years	9,899	
Total deaths, first 50 weeks of year	456,199	457,458
Deaths under 1 year of age	676	695
Average for 3 prior years	694	
Deaths under 1 year of age, first 50 weeks of year	33,080	36,405
Data from industrial insurance companies.		
Policies in force	70,772,413	66,993,558
Number of death claims	13,035	12,493
Death claims per 1,000 policies in force, annual rate	9.6	9.7
Death claims per 1,000 policies, first 50 weeks of year, annual rate	9.2	9.2

Regular Corps Examination for Nurse Officers

A competitive examination for appointment of nurse officers in the Regular Corps of the United States Public Health Service will be held on March 17 and 18, 1949.

Appointments will be made in the grades of junior assistant nurse officer (2d lt.), assistant nurse officer (1st lt.), and senior assistant nurse officer (capt.). Appointments provide opportunities for a career at Marine hospitals and in programs such as mental hygiene, nutrition, control of cancer, diabetes, heart disease, and tuberculosis.

Applicants for appointment in the grade of junior assistant nurse officer must be United States citizens, at least 18 years of age, graduates from approved schools of nursing with baccalaureate degrees, and currently registered as professional nurses. An applicant for appointment in the grade of assistant nurse officer must, in addition to the above requirements, be at least 21 years of age, and have had at least 7 years educational training and professional experience subsequent to high school. (Every applicant who, after July 1, 1943, has received a certificate in the nursing profession from an approved school, who applied for examination for appointment as a nurse officer in the assistant grade prior to January 1, 1953, and who has had, during the 5 years immediately prior to the date of such application, 4 years or more of experience as a nurse in the Army, Navy, or Public Health Service with a satisfactory record of active service, may substitute such certificate and experience for the required academic degree.) Applicants for the senior assistant grade must, in addition to the requirements for assistant grade, have had an additional 3 years or more of educational training or professional experience (a total of 10 years or more subsequent to high school). Qualifying applicants will receive written professional tests, an oral interview, and a physical examination.

The written examination will include general nursing, supervision of nursing practice, hygiene, communicable disease nursing. The examination will be held at the following cities: Baltimore, Norfolk, New Orleans, San Francisco, Seattle, Chicago, Cleveland, Detroit, Boston, Memphis, Kirkwood (Mo.), Staten Island, Los Angeles, Lexington (Ky.), Fort Worth, Kansas City (Mo.), Denver, Atlanta.

Entrance Pay (per annum)

Rank	Base pay	Rental and subsistence allowances (without dependents)	Total	Rental and subsistence allowances (with dependents)	Total
Junior assistant	$2,160.00	$795.50	$2,955.50	$1,231 00	$3,391.00
Assistant	2,400.00	975.50	3,375.50	1,411.00	3,811.00
Senior assistant	2,898.00	1,155.50	4,053.50	1,591.00	4,489.00

Application forms and additional information about extra benefits may be obtained by writing to the:

Surgeon General,
United States Public Health Service,
Washington 25, D. C.
Attention: Division of Commissioned Officers.

Completed applications must be received not later than February 17, 1949.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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Q Fever Studies in Southern California

II. An Epidemiological Study of 300 Cases[1]

By M. DORTHY BECK, *Epidemiologist*,[2] JOSEPH A. BELL, M. D.,[3] ERNEST W. SHAW, M. D.,[3] and ROBERT J. HUEBNER, M. D.[3]

Q fever was first recognized in California in April 1947, by Young (*1*). Shepard and Huebner confirmed the diagnosis by recovering *Coxiella burneti* from the blood of four cases and by finding specific complement fixing antibodies in the blood serum of 17 cases (*2*). The occurrence of these cases in southern California did not follow the epidemiological pattern previously described in Q fever outbreaks (*3, 4, 5*). The present report will show that the total 300 cases now recognized in this area have occurred over a long period of time in the general population; they have not occurred as a self-limited epidemic confined to a specific occupational group. In view of this unusual occurrence the United States Public Health Service, the California State Departments of Public Health and Agriculture, and the Los Angeles City and County Health Departments have undertaken rather extensive studies of the disease. These studies began in September 1947, and are still underway as a cooperative project. They are concentrated in the city and county of Los Angeles but extend to adjacent counties when indicated by epidemiological considerations. The aim of these studies is to determine the modes of spread of the infection and the chief source of human disease.

The first in this series of reports described the recovery of *C. burneti* from 40 out of 50 specimens of raw milk collected on five dairies (*6*). The present report deals with the preliminary observations of the disease in persons. The search for cases, the diagnostic criteria, and some of the clinical and laboratory characteristics of recognized cases are described. Then an analysis is made of the epidemiological characteristics of cases in order to derive hypotheses as to the possible sources and modes of spread of infection. Several hypotheses have been derived and specific epidemiological surveys are being carried out to test their worth. These specific surveys will be the subject of future reports.

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[1] From the Q Fever Laboratory which is supported by the National Institutes of Health, the California State Departments of Public Health and Agriculture, and the Los Angeles City and County Health Departments.

[2] California State Department of Public Health.

[3] Senior surgeon and senior assistant surgeon, Laboratory of Infectious Diseases, National Institutes of Health, Public Health Service, Bethesda, Maryland.

Case Finding

The difficulties of case finding are manifold. In the first place the disease is relatively new; it is not reportable in California and it is not readily recognized clinically. In addition, no specific therapy of proved value has been reported to date; a patient is usually well by the time present laboratory procedures can be completed to establish a definite diagnosis; and a person ill with the disease is not likely to transmit it to his contacts (*3, 7*). Furthermore, other investigators (*7, 8*) who have studied the spread of the infection have found many of the resulting cases so mild that their clinical aspects alone would not have suggested Q fever.

In full appreciation of these difficulties in case finding, this study has not made an all-out effort to locate all cases occurring in the more than four million people who live in the Los Angeles area. It is believed that the 300 cases found constitute only a small sample of the total number of cases which have occurred and it is further believed that these cases are not necessarily representative of the natural occurrence of the disease in this area. The number of cases found by any one case-finding method appeared to depend upon the amount of effort expended. Thus, it is necessary to be ever cognizant of the methods used to locate cases when evaluating the general significance of the study findings.

The following methods were used to locate the cases reviewed in this report:

(*a*) In general, talks on Q fever were delivered at meetings of county medical societies, groups of doctors, hospital staffs, and health officers, to stimulate interest in the study of this disease and in the differential diagnosis of possible cases.

(*b*) Visits were made to physicians to inform them of the presence of the disease in this area, its clinical manifestations and the laboratory procedures required for a definite diagnosis. Inquiries were made regarding cases of atypical or virus pneumonia which had occurred in their practice. It was requested that samples of blood be obtained from such cases for a Q fever complement fixation test and that all cases be reported to the laboratory for epidemiological investigation.

(*c*) Case records of various hospitals were searched for possible cases, and hospital staffs and laboratories were requested to send acute and convalescent blood specimens on all patients having pneumonia to the Q fever laboratory for complement fixation tests.

(*d*) Various industries concerned with the handling of livestock were visited and inquiries made as to the existence of unusual illnesses suggestive of Q fever.

(*e*) The local health departments who cooperated in this study sent the names of suspected cases and blood sera to the Q fever laboratory for investigation and study.

(*f*) When cases were located, inquiries were made as to knowledge of similar illnesses among their acquaintances, and these were investigated when the symptoms suggested Q fever.

(*g*) An epidemiological analysis of the first 116 cases (*9*) found by the above methods suggested certain specific epidemiological surveys. Although these surveys are not discussed in this paper all cases encountered are included in this report inasmuch as their epidemiological attributes were not essentially different from the first 116 cases.

Diagnostic Criteria

A definite diagnosis of Q fever requires that either *C. burneti* be isolated from the patient's blood, secretions, or tissues, or specific antibodies must be shown to develop in the blood serum of the patient during the course of the disease. The complement fixing antibodies which result from *C. burneti* infection are considered specific (*3*, *11*); they rarely cross react with other rickettsial infections and have not been found in other febrile illnesses. These specific antibodies may persist for many years (*11*). The 300 cases included in this report had a definite diagnosis as described above or had a clinical illness consistent with Q fever and specific complement fixing antibodies in their blood serum. They were classified as follows:

(*a*) Recovery of *C. burneti* from tissues at autopsy (2 cases), from blood of acutely ill patients (7 cases), and from urine of a convalescent patient (1 case). These 10 recoveries of *C. burneti* resulted from 18 attempts to isolate the organism in various stages of illness. No effort was made to determine the proportion of patients from which the organism could be recovered.

(*b*) A fourfold rise of complement fixing antibody titer in paired specimens of blood serum taken in the acute and convalescent stage of illness (98 cases, 7 of which are included in (*a*) above).

(*c*) A complement fixing antibody titer of 3+1:32 or higher, in blood specimens taken during convalescence or later in the disease (181 cases, 1 of which is included in (*a*) above).

(*d*) A complement fixing antibody titer of 3+1:8, or higher, but less than 3+1:32 in blood specimens taken months or years after illness (19 cases).

Each of the above groups of cases was tabulated separately for every epidemiological analysis made. In every instance these epidemiological attributes were distributed in a random manner between the groups. Table 1 exemplifies the analyses carried out. It specifically shows that the age distribution of cases was similar in each of the four groups. Attributes other than age, e. g., sex, race, occupation, residence, milk supply and date of onset of illness were tabulated in a similar manner and in every instance the distribution among the four groups was well within the range of chance sampling variation. Since criteria (*a*) and (*b*) are accepted to represent Q fever, a single entity, the above distributions would be difficult to explain if (*c*) and (*d*) do not by and large represent the same entity. Hence, for the purpose of this paper the cases in all four groups are treated as cases of Q fever.

Table 1. *Distribution of cases by age and diagnostic criteria*

Years of age	Diagnostic criteria *				Total cases
	A	B	C	D	
<30	1	27	51	5	84
30–49	8	45	97	11	161
>49	1	19	32	3	55
Total	10	91	180	19	300

* See text for definition

Clinical Observations

Detailed clinical findings are not presented on all cases because some of the clinical records taken at the time of illness, particularly on the early cases, were not available and others were incomplete. Furthermore, a detailed report on 80 of the hospitalized cases is being published by Denlinger (*10*).

The incubation period has been reported by other investigators (*3*, *4*, *7*) to range from 14 to 32 days. In this study the following single exposures to a likely source of infection were noted: Three patients began using raw milk 2 weeks before onset; three patients began using raw milk 3 weeks before onset; an insurance man visited a dairy barn 14 days before onset; an electrician wired a dairy barn 16 days before onset; a person seeking employment visited a slaughter house 2 weeks before onset; a dairyman began work on a particular dairy 10 days before onset, whereas, three others began work 1 month before onset; a person installed radio equipment in a dairy barn 1 month before onset; and one person began working in a fat rendering plant 4 weeks before onset. These 15 cases suggest that the incubation period ranges from 10 days to 1 month which is compatible with published reports.

In this series the onset of Q fever was generally sudden. Occasionally, however, prodromal symptoms of malaise and anorexia were present for 24 to 48 hours. The most frequent initial symptoms were headache, myalgia, anorexia, chilly sensations and fever.

The fever ranged from 100–101° to 104–105°, fluctuating one or more times daily. A relative bradycardia was usually present and, except in the cases with widespread pneumonitis, the respiratory rate was normal or only slightly increased. The more severely ill patients with pneumonitis presented a cough, occasionally with hemoptysis and chest pain often referred to the site of the infiltration. Dullness, increased fremitus, bronchial breathing and rales were usually present when the infiltration was extensive.

A red maculo-papular rash which blanched on pressure was observed in 17 cases. It may have occurred in others unnoticed. The lesions were 2–3 mm. in diameter and were sparsely distributed over the trunk. They were observed on the fifth to eighth day of illness and persisted only a few days. Their diagnostic significance is questionable.

The severity and the duration of the disease varied greatly. Some patients required prolonged hospitalization while others were only slightly incapacitated. The duration of fever was from 1 to 35 days, the average being 9 days. The temperature usually subsided by lysis. Most patients recovered quickly after defervescence but many of the severe cases had weakness for 2 to 3 weeks. Weight loss of 5 to 15 pounds was not unusual in severe cases.

The complications were incompletely recorded, however pleural effusion was noted in three cases, hepatomegaly in four cases, and one case each of transient epididymitis and orchitis was observed. A recurrence of fever was noted in four cases and this was associated with extension of pneumonitis in one case and onset of a pleural effusion in another. Ten of the seriously ill patients are known to have had toxic psychoses with disorientation and hallucinations and occasionally nuchal rigidity. Three patients complained of aching in the legs for 2 weeks, one month, and 8 months, respectively. It may be of interest that one patient had a preexisting silicosis, three had preexisting tuberculosis and two had preexisting Hodgkin's disease.

Aside from the complement fixation and sedimentation tests other laboratory findings were essentially negative. The results of the complement fixation tests will be described later. Sedimentation rates were moderately increased during the acute stage of the illness. The white blood counts and urine analyses were generally within normal limits. No cold agglutinins were demonstrable. Sugar and protein levels and cell counts were normal in the spinal fluid of 15 patients.

Roentgenologic evidence of pneumonitis, often described by roentgenologists as the "atypical" type was present in 97 of 115 cases

X-rayed. Of these 97 cases, physical findings were noted in the thorax of 89 but such findings were also noted in 10 of the 12 whose roentgenograms were normal.

A differential diagnosis is often difficult to make in the early stages of Q fever. The milder cases were usually thought to have the "flu". The more severe cases were commonly diagnosed as primary atypical pneumonia. The illnesses most frequently confused with Q fever in this area are exemplified in the following list showing the diagnoses considered by the physician on first seeing the patient:

	Cases		*Cases*
Primary atypical pneumonia	70	Typhoid fever	3
Q Fever	69	Typhus	3
Pneumonia (broncho and lobar)	37	"Virus infecton"	2
Influenza	21	Infectious mononucleosis	2
F.U.O. (fever of undetermined origin)	14	Staphylococcus septicemia	1
Brucellosis	8	Brain abscess	1
Meningitis	4	Tuberculosis	1
Poliomyelitis	4	Bronchogenic carcinoma with abscess	1
Malaria	3	No diagnosis or unknown	56

Three deaths have occurred in recognized cases. One was complicated with Hodgkin's disease, one was complicated with a healed myocardial infarction and the third gave a history of a chronic illness with recurring fever since 1943. This case will be discussed in a future report. It is noteworthy that several persons have been found with a chronic febrile illness dating back to a proved attack of Q fever.

Laboratory Findings

In the California series of 300 cases a total 483 complement fixation tests have been made. Table 2 shows the distribution of titers, expressed as a percent of the number of tests made at various periods of time after onset of illness. The method of case finding and the fact that paired specimens were taken in the acute and convalescent stages of the disease in 98 cases contributes to the uneven distribution of the number of tests made in each time interval. The column "percentage negative" shows for each time period the proportion of tests in which there was no fixation whatsoever or in which the titer was less than 3+1:8. These percentages decrease progressively as the time from onset increases. The columns showing percentages of persons having complement fixing antibodies at various times after onset are self-explanatory. The extremes of the distribution are noteworthy. Thirteen percent (6/45) of persons tested during the first 6 days of illness had complement fixing antibodies. Six percent (6/105) of persons tested during the period 11–21 days of illness had no complement fixing antibodies. These extremes may possibly represent individual variation in speed of antibody response or they may represent inaccurate dates of onset. The latter were rechecked and no more accurate information was available. In general, table 2 shows that both the proportion of persons with antibody titers and the height of the titers increase progressively from onset until the fourth week of illness; thereafter, the proportion with high titers gradually decreases.

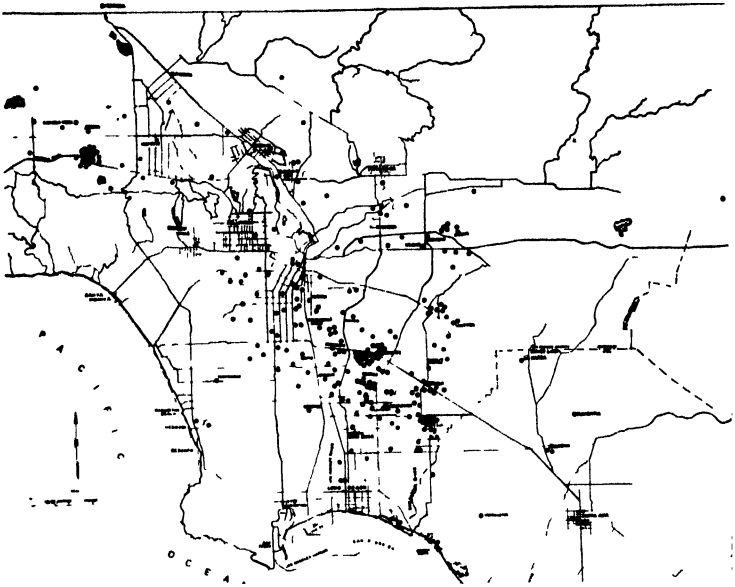
Table 2. *Distribution of 483 complement fixation titers for Q fever expressed as a percent of the number of tests made at various periods after onset of illness (300 cases)*

Periods of time after onset	Number tests	Percent negative	Percent with 3+ fixation at specified dilution or higher*			
			1:8	1:16	1:32	1:64
Days						
1-2	7	100	0	0	0	0
3-4	17	88	12	0	0	0
5-6	21	81	19	19	14	10
7-8	28	46	54	43	32	21
9-10	38	29	71	63	53	34
11-12	18	11	89	78	78	72
13-14	21	14	86	86	86	67
15-21	66	2	98	95	91	85
22-30	36	0	100	100	97	94
Months						
1-5	128	0	100	100	95	80
6-11	34	0	100	97	94	88
Years						
1	46	0	100	100	85	63
2-7	23	0	100	100	65	61

*No titrations were made at dilutions greater than 1:64

Epidemiological Findings

The geographic distribution of cases was to some extent dependent upon the intensity of search for cases in a particular area. Of the 300 cases, 282 have occurred in Los Angeles County, 10 in Orange, 4 in San Diego, 2 in San Bernardino, and 1 each in Santa Barbara and Ventura Counties. The map illustrates the general distribution of cases in Los Angeles County and part of Orange County. It shows that the cases are fairly widely distributed. The map does not give the varying density of population but no apparent correlation existed between density of population and density of cases. In general, there are three concentrated foci of cases, namely, in the Artesia area where the disease was first recognized, in the Downey area where the Q fever laboratory is located and in the Tarzana area where intensive studies were carried out in connection with a large dairy. Quite aside from these three areas there appears to be an unusual concentration of cases in close geographical association with dairies. The rapidly expanding cities have built up adjacent to the corrals of the many dairies in this area.



Q fever cases in Los Angeles County and vicinity.

In table 3 are the total number of cases by month and year of occurrence as obtained by history. It appears that Q fever has existed in this area for a number of years and the evidence indicates that the presently occurring cases are merely a part of a recently recognized but long standing endemic pattern. Table 3 also shows that a sizable proportion of the cases have occurred in every month of the year. The seasonal variation in the number of cases located by the case finding methods used in this study was so slight that a larger experi-

Table 3. *Distribution of cases by months and years of occurrence*

Month	Years					Total
	1941-44	1945	1946	1947	1948	
January				3	14	17
February	1	1	2	9	14	27
March	1	1	2	6	15	25
April		1	2	12	14	29
May			2	13	18	33
June	2		3	14	9	28
July			3	14	3	20
August		1	5	20		26
September		1	3	21		25
October		1	5	21		27
November	3	1	2	26		32
December		1	2	8		11
Total	7	8	31	167	87	300

ence would be necessary to determine the true seasonal pattern, if one exists in this area.

Cases were observed in both sexes, in various races and at ages varying from 3 to 75 years. Table 4 shows the distribution of cases by sex and age. Twenty-one percent of the cases were in females. This is small as compared with the nearly equal sex distribution of the general population but it is large when compared with the cases reported in the literature (*11*). By age, 91 percent of the cases occurred in the 20–59-year age groups. This is large when compared with the general population of this region, 60 percent, but not greatly different from cases reported in the literature (*11*). Of the 300 cases, 286 were whites including 7 Indian-Mexican, 13 were Negro, and one was Chinese. Aside from the fact that three races were afflicted no particular significance can be attached to the race distribution.

Table 4 *Distribution of cases by age and sex*

Age group	Male	Female	Total number M and F	Percent of cases	Percent of Los Angeles population*
0–19	8	4	12	4	26
20–29	58	13	71	24	17
30–39	77	19	96	32	17
40–49	50	16	66	22	15
50–59	31	7	38	13	12
>59	13	4	17	5	13
Total	237	63	300	100	100
Percent	79	21	100	-	-

*Sixteenth census of the Los Angeles metropolitan area

In evaluating the age, sex, and race distribution, consideration should be given to the possibility that certain age, sex, or race groups (e. g. children, females, etc.) may tend to have mild or inapparent infections and, if so, they would have been unlikely to come to the attention of this study. Furthermore, the methods used for case finding might possibly produce a study group of cases with an age, sex, and race distribution somewhat like that observed; however, it is doubted that this alone would produce a case distribution so markedly different from that of the general population as shown in table 4. When cases were arranged by year of onset the age, sex, and race distribution was not significantly different from the total shown in table 4. The age, sex, and race distribution suggests that industrial occupation may be an important source or mode of spread of the disease.

The diverse occupational distribution, tabulated below, is remarkable when compared with the usually reported outbreaks limited to employees of stockyards, abattoirs, dairies and laboratories (*3, 4, 5, 8, 18*). As compared with the general population there appears to be an unusually high occurrence among workers in the livestock industry. On the other hand the large number of cases that occurred among persons having no association with the livestock industry suggests that the sources of infection or modes of spread of the disease are by no means limited to specific industrial occupations.

An analysis of the occupational history showed that the cases were distributed among 60 different occupational groups as follows:

Dairymen	*46
Housewives	45
Metal tradesmen	18
Fat rendering plant workers	17
Building tradesmen	15
Creamery workers	12
Salesmen	11
Mechanics	11
Students	11
Packing plant workers	9
Agricultural workers	6
Truck drivers	6
Electricians	5
Doctors of medicine	5
Clerical workers	5
Oilfield workers	4
Livestock workers	4
Railroad workers	3
Teachers	3
Engineers	3
Nurses	3
Feed mill workers	3
Retail meat market employees	3
Milk testers	2
Children	2
Veterinarians	2
Autopsy room assistants	2
Chemists	2
Waitress and waiter	2
Service station attendants	2
Radio technicians	2
Patrolmen	2
Dairy inspector	1
Meat inspector	1
Sheep shearer	1
Hide house worker	1
Doctor of osteopathy	1
Dentist	1
Upholsterer	1
Baker	1
Druggist	1
Poultry raiser	1
Rabbit raiser	1
Kennelman	1
Road construction worker	1
Rubber company employee	1
Dress manufacturer	1
Hod carrier	1
Installer of venetian blinds	1
Installer of church fonts	1
Fish hatchery worker	1
Film technician	1
Insurance salesman	1
Dress fitter	1
Showman	1
Actress	1
PBX board operator	1
Hotel night clerk	1
Library cataloguer	1
Assistant water superintendent	1
Unemployed	6

*Three were workers on a goat dairy.

Possible Sources and Modes of Spread

There is good epidemiological evidence in the literature (*3*, *7*) that Q fever is rarely, if ever, transmitted directly from one human to another. In the investigation of each individual case in this study it was rare to obtain a history of prior contact with another case during the probable incubation period of the disease. A search was made for additional cases in the household of each patient and in many instances blood specimens were tested on all members of the family. Multiple cases occurred in the same household in only six instances. These are summarized together with the history of all known exposures to possible environmental sources of infection as follows:

(*a*) A man and his wife in the same household had their onsets 1 day apart. For 1 month prior to onset of illness they had both been working on a dairy and using raw milk from that dairy.

(*b*) A man and his wife in the same household had their onsets 4 days apart. The husband was a gardener (agricultural worker) and handled considerable fertilizer in his work.

(*c*) A husband and wife living in the same household had their onsets 3 weeks apart. They had moved to a street across from a dairy 1 month before the husband's onset—a street where three other cases had developed. The husband's brother came to visit them often while he was ill and the brother developed Q fever about 6 weeks after the initial case. One boy 8 years old was not ill.

(*d*) At a home for old men, one frank clinical case developed in a man 54 years old who had been there 1 month. The home was located near several dairies and raw milk was used. Two men, aged 65 and 85, who had not been ill but who lived in the same abode were found to be positive for Q fever in high titer by complement fixation test. These men may have had inapparent infections.

(*e*) A husband and wife living in the same household had their onsets on the same day. They were not exposed to any known likely source of infection.

(*f*) Of six members of a white family living in one household, four had onsets of illness within 8 days of each other. The 2-month-old infant had not been ill and was not bled.

Name	*Age*	*Sex*	*Date of onset*	*Type of illness*	*Date C-F test*	*Result*
1. H. H.	54	M	....	No illness	6/17/48	4+1:64
2. T. G.	23	M	6/1/48	Hospitalized, severe	6/10/48 6/17/48	4+1:64 4+1:64
3. I. H.	46	F	6/2/48	In bed at home, severe	6/10/48 6/17/48	3+1:64 4+1:64
4. E. G.	25	F	6/2/48	F. U. O. fever, chills, headache, for 1 day, mild.	6/17/48	3+1:32
5. L. H.	3	M	6/9/48	F. U. O. headache, fever 3-4 days, mild.	6/17/48	4+1:64
6. B. G.	2/12	M	......	No illness	No specimen	....

This household presented various degrees of infection from no illness to illness severe enough for hospitalization. H. H. who was not ill had been buying calves at the dairies in the Artesia district for 2½ months prior to June and delivering them to packing houses. His clothes, often soiled with calf excreta, were brought into the house. I. H. had ridden in the truck 1 month prior to illness and T. G. had also ridden in the truck.

The above 6 instances which comprise only 14 of the total 300 cases are far below that which would be expected if person-to-person contact were an important source of human disease. In addition, the interval between dates of onset of cases occurring in the same household is much shorter than the usual incubation period of 10–32 days. This suggests a common source of infection, rather than a direct person-to-person mode of spread. Furthermore, the age, sex, geographic, seasonal and occupational distribution of the cases indicated that a person-to-person mode of spread of the disease is of little or no consequence in this endemic area.

The case distributions and case histories suggest that the human disease results from contact with some natural source of infection in the environment. Some animal or arthropod reservoir of infection seems likely inasmuch as *C. burneti* has been cultivated only in the presence of living cells and efforts to produce growth in an inanimate media have been unsuccessful. Direct human contact with an animal or arthropod source of infection would not appear to be essential since *C. burneti* is very resistant to physical and chemical agents as compared with other pathogenic micro-organisms (*12*). Even though this organism may not multiply in the inanimate environment it could persist as a possible source of infection in such an environment for a long period of time.

At first glance a blood sucking arthropod would seem to offer a likely source or mode of spread of infection in humans because (*a*) *C. burneti* is present in the blood stream of humans ill with the disease and thus they presumably may be infected by this route; (*b*) other rickettsial diseases are known to be transmitted by blood sucking arthropods, and (*c*) *C. burneti* has been found to occur naturally in five species of ticks, viz., *Haemaphysalis humerosa* (*13*), *Amblyomma americanum* (*14*), *Dermacentor andersoni* (*15*), *Dermacentor occidentalis* (*16*), and *Otobius megnini* (*17*). Two of these ticks have been found naturally infected in this area. *O. megnini*, the spinose ear tick of cattle, has been collected in large numbers on cattle distributed throughout the localities where cases have occurred but this tick rarely bites man. *D. occidentalis* occurs in the nearby hills, quite removed from population centers and geographic areas where cases appear to be concentrated. Also, patients have been questioned with respect to visits to the foothills prior to onset of illness and questioned and examined for evidence of bites from arthropods. Very few had made such visits and extremely few had any recollection of such bites. In these few there was no constant time relation between such bites and onset of illness. Furthermore, the distribution of cases in this area by age, sex, occupation, and season would be difficult to explain if a blood sucking arthropod were an important source of human cases in this locality.

Cows (*6*), sheep and goats (*19*), and bandicoots (*21*) are the animals which are reported to be naturally infected with *C. burneti*. Bandicoots do not exist in the Los Angeles area. Sheep and goats are present but their distribution is not abundant. Complement fixing antibodies for Q fever have been reported in the blood sera of goats in northern California (*20*). Attempts to recover the organism from sheep and goats in southern California are underway. In the individual case investigations very few contacts with sheep and goats could be elicited. However, the following instances appear significant: (*a*) The owner of a goat dairy developed Q fever presumably 2 weeks after he started to work on the dairy in 1945. Two employees on the same dairy developed Q fever in July 1947; one began employment 1½ months prior to onset and the other 3 months prior to onset. Incidentally, two other employees had similar illnesses with penumonia at the same time but no blood specimens were obtained for complement fixation tests. (*b*) One patient used raw goat's milk continuously for 5–6 years, and one used raw goat's milk in the form of ice cream 2 weeks before onset. (*c*) Two patients were exposed to sheep. One began shearing sheep 10 days before onset of illness, and the other stood by during the unloading of several hundred sheep 2 weeks before onset of illness. Thus sheep and goats may be a potential source of human cases in this area but at this time it seems unlikely that they constitute a major source or mode of spread of the disease.

Dairy cows have been found naturally infected with *C. burneti* in this area (*6*). Reliable estimates indicate that more than 10 percent of such dairy animals have complement fixing antibodies for Q fever in their blood sera and that more than 50 percent of the raw milk produced here contains sufficient amounts of *C. burneti* to produce demonstrable illness when small quantities are injected into guinea pigs. There are some 800 dairies in the city and county of Los Angeles and some 60,000 cows are imported each year. Dairy cows stay in the milking string a comparatively short time, an estimated average of 3 years. From the dairies they go to local slaughterhouses—very few emigrate. Thus dairy cows and raw milk present a tremendous natural reservoir of *C. burneti* in the Los Angeles area.

In consideration of the likely sources of infection every case has been investigated to determine the possible modes of effective contact. Table 5 distributes the cases according to possible contact through residence, occupation and milk supply. In view of the laboratory epidemics (*3*, *22*, *23*, *24*) and the occurrence of the disease in the military groups (*7*, *25*, *26*), an airborne (dust or other particulate matter) method of spread was considered. Cases were classified as to whether they resided within one-quarter of a mile of a dairy or livestock yards. In view of the occurrence of the disease in persons associated with livestock (*4*, *8*), cases were classified as to whether they had occupational contact with livestock (cattle, sheep and goats) and in the processing of their raw products. In view of the prevalence of infection in the raw milk of this area, table 5 also classifies the cases as to whether they used raw milk in their households. The latter classification is justified, since pasteurization, particularly by the short time high temperature method, has been tentatively demonstrated to reduce the infectivity of milk to an extent where it no longer produces detectable disease when injected into guinea pigs (*6*). Only 286 cases are included in the table because complete information on each of these attributes was not available in all 300 cases.

Table 5. *Distribution of cases according to contact with possible sources of infection through residence, occupation, and household milk supply*

Residence <¼ mile from livestock	Occupation with animals or their products*	Household milk supply		Totals	Sex distribution	
		Raw	Other		Male	Female
Yes	Yes	26	21	47	46	1
	No	20	61	81	54	27
	Total	46	82	128	100	28
No	Yes	13	50	63	63	0
	No	31	64	95	62	33
	Total	44	114	158	125	33
Total	Yes	39	71	110	109	1
	No	51	125	176	116	60
	Total	90	196	286	225	61

* Occupational contact pertains to contact with cattle, sheep, goats and the processing of their raw products.

This table also includes the sex distribution in order to determine whether the over-all preponderance of males might be due to occupational characteristics of the disease. It will be noted that among the 110 cases having occupational contact 109 were males. Among the 176 cases having no such occupational contact 116 or 66 percent were males. Thus the over-all preponderance of males was largely due to a likely occupational source or mode of spread of the disease in this locality.

In table 5, if occupation is hypothecated to be the exclusive mode of spread of the disease in this area, only 38 percent ($^{110}/_{286}$) of the known cases would be accounted for. If living in close association with dairies, or livestock yards, is hypothecated to be the exclusive mode of spread of the disease, then only 45 percent ($^{128}/_{286}$) of the known cases would be accounted for. In a like manner, if the use of raw milk in the household is hypothecated to be the exclusive mode of spread of the disease, then 32 percent ($^{90}/_{286}$) of the recognized cases would be accounted for. When all three of the above possible modes of spread of the disease are considered all but 64 cases are included, accounting for 78 percent ($^{222}/_{286}$) of the total cases. This is a sizable proportion of the known cases when account is taken of the remote date of onset of some cases (table 3) and when it is appreciated that only positive information was classified, i. e., if there was some doubt as to whether an individual had occupational or other contact, he was classified as having no such contact.

It is further to be noted that with each of the above hypotheses the proportionate distribution of cases far exceeds any liberal estimate of the distribution of the population in the area. Certainly, 38 percent of the people in this area do not have occupational contact with animals and their raw products; 45 percent of the population do not live within a quarter mile of a dairy or livestock yards, and 32 percent of the people do not use raw milk. Actually far less than 5 percent of the milk distributed in the area is unpasteurized. Thus, it is concluded that all three hypotheses are tenable and hence specific epidemiological studies have been set up to examine their worth.

Summary and Conclusions

Three hundred cases of Q fever, with three deaths, have been investigated in Los Angeles and vicinity since September 1947. The method of case finding has been described and the general clinical and laboratory findings and diagnostic criteria discussed. Four hundred eighty-three complement fixation tests were made and, in general, the titers increased from zero to a peak during the fourth week of illness and then tended to gradually subside over a period of years. The cases occurred throughout the area at all seasons and over several years. They were predominantly males in the industrial age groups, however their occupations were extremely diversified. In all, the epidemiological findings suggested three general hypotheses as to the modes of spread of the disease in this endemic area—occupation in the dairy or livestock industries, residence in close approximation to a dairy or livestock yards, and household use of raw milk. No one of these possible modes of spread would account for more than one-half of the cases. Specific epidemiological studies have been arranged to determine the worth of each of these hypotheses.

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Experimental Animal Colony in Tropical West Africa

By Hildrus A. Poindexter,[1] *Senior Surgeon (R), Public Health Service*

The animate agents and vectors responsible for the major infectious diseases of tropical climates are available in abundance to any investigator who comes to the tropics to study them. The malarias, the dysenteries, the helminthiases, trypanosomiasis, and the treponemiases make up the great infectious pentad which contributes greatly to the death and retardation of the native peoples of Liberia and the adjacent areas of West Africa. The colossal waste of human life and energy caused by these diseases, especially in Africa and Asia, stands as a persistent challenge to epidemiologists and public health specialists of the western world. Most of the animate etiological agents and the vectors of this group are well known, but their biology is less well known, and the variable factors in their host-vector-parasite relationships are very poorly understood.

In countries where the so called tropical diseases are most prevalent, the average income and financial status of the population are notoriously low. Any practical solution of the several problems of prevention and control of these tropical diseases must be based upon economic feasibility. The economic factor alone makes further research on host-vector-parasite relationships of paramount importance, since it is essential not only to find a weak point in the cycles but also the most economical key to the problem of prevention and control.

Standard experimental animals in adequate numbers are essential for research in tropical diseases, but in tropical West Africa such animals are not available in adequate numbers at any of the experimental laboratories on the West Coast between Timbuktu and the equator. For those not experienced in breeding animals for experimental use it might appear that to maintain a healthy colony would not be too difficult. The fact is, however, that the problem is a very difficult one, and the several laboratories engaged in biological studies requiring large numbers of experimental animals order them from Europe or America. This expensive item has retarded large scale experimentation in this part of Africa.

In January 1947, the Public Health Service and the writer undertook to study the possibilities of maintaining a colony of experimental animals in Liberia, using local food and native labor. The animals were to be used to supply the various research projects of the Public

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[1] This work was done while serving as Chief, Laboratory and Medical Research of a United States Public Health Service Mission in Liberia, 1947 and 1948.

Health Service Mission in Liberia. This paper deals with observations and problems of maintaining this colony in Liberia during the first 18 months of its operation.

Equipment and Animal Colony Composition

The colony in Liberia was started with healthy animals from the stock colonies of the National Institutes of Health laboratories at Bethesda, Maryland. The writer accompanied the initial shipment of four cages by Pan American Airways from New York City to Robert's Field, Liberia. In spite of the freezing temperatures of New England, Newfoundland and the Azores, and the high altitude flying of the Pan American Constellation, the animals reached Monrovia in an apparently healthy condition. The original batch consisted of 9 white rabbits, 16 guinea pigs, 12 white rats, and 18 white mice, all young adults. Adequate cages and a well-built, well-ventilated animal house were constructed shortly after the arrival of the animals. The animals were caged in groups of three, one male and two females of the same species to each cage. Food was obtained from local gardens and the open market, and water from a nearby well. The quarters and cages were kept sanitary by laborers who also assisted in the frequent inspection of the animals for infections and infestations. Pregnant animals were placed in individual cages. In addition to the animals from the National Institutes of Health, there were transients in the colony taken in either for acute experiments or for observation for suspected rabies. At one time or another these transients included dogs, cats, native wild rats, shrews, chickens, canaries, snakes, iguanas, small lizards, frogs, fishes, turtles and others.

General observations on the stock animals during the first months of adjustment—During the first 6 weeks in Monrovia there was considerable difficulty in getting local clean food substitutes for the staple rations to which the animals had become accustomed at the N. I. H. laboratories. There was also some difficulty in getting nonpolluted water in sufficient quantities, at that season of the year in Monrovia. The protection of the animals from a variety of insects including the vicious "Driver" ants, mites, and larvae of Cordylobia sp., and from the dermatomycotic infections was an additional problem.

The first tragedy in the colony was an outbreak of *Salmonella typhimurium* and other salmonella infections which resulted in the death of all female white rats, leaving only 4 male adults and no offspring; of 2 white mice, leaving 16 adults and 21 young, and of 3 guinea pigs, leaving 13 adults and no offspring. During this period 3 white rabbits became infested with Tumbu fly maggots with resulting secondary skin lesions. Two died—one from a secondary skin infection and the other from a terminal gastro-enteritis.

This outbreak was brought under control by adding one-half teaspoonful of sulfadiazine to every quart of water used for drinking and for washing of green food; isolation of all sick animals in separate cages and the free use of 3 percent solution of Cresylone (a saponified cresylic acid) in water for cleaning of cages and quarters; spraying quarters with DDT, and local treatment of the open sores caused by the maggots, mites and/or fungus infections and the secondary pyogenic invaders.

With the outbreak apparently controlled and the animals eating well and looking healthy, the unexpected happened. Cannibalism developed and increased to an alarming degree. Within 2 weeks all the young mice and those born during the period were killed and eaten, chiefly by their mothers, which is unusual. The few guinea pigs born during the period were killed and eaten and there was evidence of young rabbits born during the night being eaten before the next morning. When young were not available to eat, the animals began to fight among themselves and whenever an adult was killed, the victors promptly devoured the victim. This threat to the colony was controlled by increasing the protein and sodium chloride in the diet; by improving the bedding in the cages, so that the young would not be bruised thus offering bleeding parts as a temptation for the adults to kill and devour; and by sacrificing, by acute experiments, the repeated offenders when caught in the act of cannibalism. At the end of 3 months the colony appeared to be stable with a group of healthy adults, but only the mice breeding.

Rabbits—The diet of the rabbits, with some variation, consisted of sweet potato tops and tubers; cassava (*Manihot utilissima*) tops and tubers; sugar cane leaves and stalks; and a variety of local grasses and leaves. Even the cost of the items of this limited diet was 13 cents per rabbit per day at Monrovia market prices. The cost of a diet of concentrated rabbit rations or of cabbages, carrots, white potatoes, and turnips, as given to rabbits in the United States is prohibitive in Liberia.

From all outward appearances these rabbits were healthy on the diet provided, but for 9 months there was not a single offspring from 4 adult females and 3 adult males even though adequate opportunities were given for breeding. Three females and two males were continued at the Monrovia station on the above diet for 6 months longer without a single offspring. In the light of the 60-day gestation period, we concluded that the few young which were born during the cannibalism flare-up were the result of conceptions which took place before the rabbits reached Monrovia.

At the end of the first 9 months of the observations, we were faced with the following questions: (a) Were the rabbits temporarily or permanently sterilized by the high flying trip to Liberia? (b) Is the diet inadequate to stimulate breeding? (c) Are the differences between the temperate climate and the humid high temperature along the coast of Liberia, sufficient to block the breeding instinct? (d) Do the lack of runways and contact with the ground interfere with the desire to copulate, or the ability of one of the sexes to reproduce?

In an attempt to answer these questions, the following observations were made:

The rabbits were not permanently sterilized because active spermatazoa were obtained from penile strippings following massages of the testes, and the injection of the urine of pregnant women as A–Z tests gave the normal swelling and hemorrhage of ovarian follicles. Incidentally none of the male rabbits at Monrovia were ever observed in an attempt at coitus.

Since the diet was certainly not ideal, but the most economical available, the vegetables were grown in the Monrovia area where the soil is known to be deficient in at least 2 inorganic elements—calcium and phosphorous,[2] and the average coastal temperature might be too high to stimulate copulation, a pair of white rabbits (male and female) and 2 females and one male of a local strain of rabbits obtained from the Firestone rubber plantation in Liberia were sent to the Ganta Mission. Ganta is located at an elevation of 1,200 feet, while Monrovia is at sea level. It has a richer surrounding soil, a mean night temperature of about 10 degrees lower than Monrovia and a lower humidity and rainfall (80 inches compared with 170 inches per year at Monrovia).

At Ganta, the rabbits were given the same items of food as at Monrovia, with the addition of elephant grass. The diet was practically the same or differed only in the amount of different elements which the sugar cane, cassava or sweet potatoes obtained from the soil or water of this district. The breeding results were startling. The second day after arriving in Ganta, the white male began to show unusual copulative activities. The copulation acts were vigorous, and the phallic organs would remain extruded for 15–20 minutes after coitus even though the animal was lifted vigorously from the enclosure and handled roughly.

From these observations, one or more of the following elements seem to be in operation: cooler nights, lower humidity, or higher altitude. The average night temperature at Ganta is about 73° F.

During the 6 months these rabbits were at Ganta, two litters of young rabbits were born [illegible] female. These included a litter of 6 and one of 8 healthy offspring. During 15 months, the 3 females and

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[2] The soil of the Monrovia area has only about 18 pounds of phosphorus per acre when between 50–75 pounds per acre would be a better average for good vegetation.

2 males of the same shipment, remaining in Monrovia, did not produce a single offspring.

In answer to the question of runway space and ground contact, special indoor and outdoor runs were constructed for the animals at Monrovia, remaining on the same diet, without any change in the breeding results; while those at Ganta were breeding satisfactorily in spite of the absence of a runway and ground contact. Incidentally, rabbits subjected to the soil and wet vegetation of the Ganta district occasionally show Schistosoma sp ova in their colons.

Guinea pigs—The diet of the guinea pigs in Monrovia was essentially the same as that for the rabbits with the occasional addition of a palm nut. The average cost was 4½ cents per animal per day at the Monrovia prices. For more than 15 months, these guinea pigs appeared to be in good health with the exception that those in Monrovia did not produce offspring other than those born shortly after their arrival in Monrovia—the result of conceptions which occurred before they reached Liberia.

At the end of 9 months of observation, one male and two female guinea pigs were transferred to Ganta. There they experienced the same changes in altitude, humidity, temperature and annual rainfall mentioned in the section for rabbits. Their Monrovia diet was supplemented by fresh shelled peanuts, fresh corn, plums, guava, and fresh beans. They were housed in the usual shipping cages with local straw and sawdust for bedding. At the end of 6½ months at Ganta, one of the original females had delivered 2 litters and was again pregnant. Females of the first litter delivered at Ganta appeared to be pregnant. The change in environment and diet seemed to be factors here.

White rats- The 4 adult males surviving the salmonella outbreak remained healthy on a diet consisting of the following local items given alone with their Krobo market names: unpolished rice (Mo); corn (whole grains) (Bulu); cheese (Cheese); ripe bananas (Koujon); sweet potatoes (Pala); sweet biscuit (occasionally) (Pede); bread (Flo); palm nuts (Hwi); milk; coconuts; avocados.

The drinking water contained 0.5 to 1.0 gram of iodized sodium chloride per liter, and at intervals 250 to 500 mgms. of sulfadiazine per liter was added. The feeding cost for rats for a colony of more than 50 is two-thirds of a cent per animal per day.

Before arriving at the staple diet given above, many combinations were tried including the mixed nuts, table scraps, store bought canned goods, ripe plantains (Musa sapientum) and several of the items used for rabbits. They were discarded either because they were too expensive or the animals did not eat them well.

Replacements for the rats lost in the salmonella outbreak were procured from the United States. These bred well at Monrovia. The present number of offspring from the white rats is between 200 and 300. Many of the rats have been used for *Trypanosoma gambiense* and cercariae of *Schistosoma hematobium* experimentations.

White mice—The white mice have bred well from the beginning. The diet worked out for the rats was satisfactory for the mice, which now have more than 500 offspring. Many have been used in Trypanosoma, Borrelia, and leprosy experiments. The cost of feeding a colony of more than 50 white mice with the ration combination given above is one-sixth of a cent per day per mouse. Two of the most important items for the successful raising of mice in the tropics are a good water supply, and frequent cleaning of cages with a liberal use of disinfectant in the water used for that purpose. Newly delivered mice must not be handled or moved for about 10 days.

Discussion

A large colony of animals adapted to the tropics and obtained at reasonable cost is very much needed in tropical West Africa. Where refrigeration and storage space free from vermin are at such a great premium, the feeding item will probably have to be taken care of from local purchases. Those interested in establishing large research units in the tropics, may find it economically advisable to grow their own animal food. Cross breeding of the temperate zone experimental animals with native stocks seems to be indicated.

Summary and Conclusion

We have recorded some of the factors involved in maintaining a healthy animal colony in tropical West Africa, the most important of which appear to be:

1. Precautions necessary to avoid infection and infestation.
2. Provision for adequate satisfactory food at a reasonable price.
3. An average night temperature below 75° F. for at least part of the year.

Staple diets have been worked out with average feeding costs for rabbits of 13 cents per day; guinea pigs, 4½ cents per day; white rats, two-thirds cent per day; and white mice, one-sixth cent per day.

These facts may be of value to those planning laboratory researches in this section. Our observations suggest that American bred white rabbits and guinea pigs will not breed well in the moist hot climates of the coast of Liberia, especially in the Monrovia area, and that a higher altitude and/or a lower night temperature may be essential to rapid reproduction of these two types of animals.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED DECEMBER 25, 1948

Of the total of 2,165 cases of influenza reported for the week (last week 2,644, 5-year median 3,684), 5 States reported 1,858 (last week 2,284), as follows (last week's figures in parentheses): Virginia 398 (288), South Carolina 131 (271), Arkansas 158 (178), Texas 1,032 (1,378), Arizona 139 (169). Only one other State (Colorado, 72) reported more than 40 cases. Since July 31 (approximate average date of seasonal low incidence), 33,449 cases have been reported, as compared with 32,861 for the same period last year, 309,301 in 1945, the highest corresponding figure of the past 5 years, and a 5-year (1943–47) median of 32,861.

A total of 6,147 cases of measles was reported, as compared with 5,984 last week and a 5-year median of 2,696. Six States reporting currently an aggregate of 3,362 cases are as follows (last week's figures in parentheses): Massachusetts 1,017 (896), New York 322 (414), Pennsylvania 327 (373), Maryland 402 (290), Virginia 402 (172), Texas 892 (712). No other State reported more than 271 cases. The cumulative figure since September 4 (average seasonal low date) is 45,343, the highest for a corresponding period since 1943 (55,289). The 5-year median for the period is 23,401.

Of the total of 203 cases of poliomyelitis (last week 264, 5-year median 89), only 2 States reported more than 11 cases—South Dakota 32 (last week 16) and California 68 (last week 90). The total for the year to date is 27,484, as compared with 25,098 for the same period in 1946 and a 5-year median of 13,648.

During the week, Idaho reported 4 cases of smallpox, and New York and Pennsylvania each 1 case of anthrax. Of 38 cases of tularemia reported (last week 34, 5-year median 25), 10 occurred in Missouri, 6 in Indiana, 5 in Arkansas, and 17 in 12 other States.

A total of 8,708 deaths from all causes was recorded during the week in 91 large cities in the United States, as compared with 9,347 last week, 8,806 and 9,290, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year (1945–47) median of 9,290. The total for the year to date is 471,682, as compared with 473,413 for the same period last year. Infant deaths totaled 592, as compared with 727 last week and a 3-year median of 639. The cumulative figure is 34,090, as compared with 37,433 for the same period last year.

Telegraphic case reports from State health officers for week ended December 25, 1948

Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine				3	1	11			12			1	30	
New Hampshire			1	9		1								
Vermont	1			160					6			1	9	
Massachusetts	12			1 01	1	32	1		139				56	
Rhode Island				16					5			1	1	
Connecticut		1	2	44	1	29			36				2	
MIDDLE ATLANTIC														
New York	4	1	[b] 1	322	2	163	6		[c] 140			2	70	13
New Jersey			2	54		36	4		45				17	
Pennsylvania	8		[b]	32	4		1		104		1	8	65	4
EAST NORTH CENTRAL														
Ohio	9			19	1	36	1		182		1		33	13
Indiana	5		2		3	2	3		74		6		3	16
Illinois	2		1	29	5	60	4		134		3	1	18	1
Michigan [a]	2		4	271		81	7		187			1	27	9
Wisconsin			14	195	4	3	1		72				15	-
WEST NORTH CENTRAL														
Minnesota	1			-	2	1	11		42				10	
Iowa				20		1	9		22				3	1
Missouri	3		5	80	3	28			23		10	2	1	
North Dakota			1	8					1					
South Dakota				2			32		1					
Nebraska			-	6			1		4					
Kansas	2		13	56	2	14	8		39		2		53	
SOUTH ATLANTIC														
Delaware				4					2					-
Maryland [a]	-	1	3	402	2	23	1		[c] 16			2	9	-
District of Columbia	1			10		13			4					
Virginia	6		398	402	1	71	2		24			3	13	
West Virginia	3		29	2	1	4	2		4				2	
North Carolina	13			40	1				23		2		9	
South Carolina	2	2	131			32	2		7				2	2
Georgia	9		2	15	1	7	2		26		2	1		12
Florida	5		1	80		4	3				1			3

EAST SOUTH CENTRAL														
Kentucky	11			29	1	28			38		1	1	3	4
Tennessee	3		20	70		19	3		49		1	1	1	
Alabama	15		34	103		25	2		5		1		5	8
Mississippi [a]	3		2	2	1	16	1		4			1	1	
WEST SOUTH CENTRAL														
Arkansas	2		158	19		31			3		5			1
Louisiana	1								2					
Oklahoma	2		40	65	1	21	1		19		1	2	1	1
Texas	13		1 032	892	2	123	8		16			1	60	38
MOUNTAIN														
Montana			2	9			1		18				1	
Idaho		1	1	79		-			•9	4				
Wyoming				9		4			1				3	
Colorado	3		72	85	2	2			18		1		5	
New Mexico			3	82		6	1		14					
Arizona	-		139	65		11			7			1	6	1
Utah [a]	2		2	197		3	9		7				3	
Nevada							1							
PACIFIC														
Washington	1		3	112		1	3		24				12	
Oregon	1		25	209	2	12	4		25				15	
California	7	1	15	257	-	13	68		56			3	21	4
Total	166	7	2,165	6 147	51	999	203		1,689	4	38	33	585	
Median, 1943-47	319	5	3,684	2,696	127		89	1	2,397	5	25	42	1 541	
Year to date, 51 weeks	9 522	561	172,264	596 757	3,200		27 484	522	76 379	61	1 003	3,554	72,337	
Median, 1943-47	13 795 (27th)	622	334 374 (30th)	594 435 (35th)	7 837 (37th)		13 648 (11th)	467	137 454 (32nd	343 (35th)	789	4,814 (11th)	122,344 (39th)	
Seasonal low week ends	July 10		July 31	Sept 4	Sept. 18		Mar 20		Aug 14	Sept 4		Mar 20	Oct 2	
Since seasonal low week	4 912		33 449	45 343	764		27 134		20 763	11		3 081	9 414	
Median 1943-47	7 265		32,861	401	1 342		13 251		36,360	70		4,190	24 808	

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[a] Period ended earlier than Saturday

[b] New York City and Philadelphia only respectively

[c] Including cases reported as streptococcal infection and septic sore throat

[d] Including paratyphoid fever reported separately as follows Michigan 1 California 1 Salmonella infections not included were reported as follows Massachusetts 2 New York 1

Anthrax New York 1 Pennsylvania 1

Alaska Pneumonia 1 scarlet fever 3 streptococcus sore throat 3

Territory of Hawaii Influenza 1 measles 278 lobar pneumonia 3

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 4, 1948.—During the week ended December 4, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		78		310	655	110	122	178	267	1,720
Diphtheria				9	5	1				15
Dysentery, bacillary				6				2		8
German measles		1		26	9		16	2	10	64
Influenza		37			8					45
Measles		107	3	365	99	122	26	105	174	1,001
Meningitis, meningococcal		1		1	2					4
Mumps		21	2	137	135	51	27	13	70	456
Poliomyelitis				1	7	2	1			11
Scarlet fever		6	2	152	65	8	9	7	8	257
Tuberculosis (all forms)		3	12	136	16	18	9		44	238
Typhoid and paratyphoid fever				4			1			5
Undulant fever					2				1	3
Venereal diseases:										
Gonorrhea		13	18	71	68	18	26	33	99	346
Syphilis		4	10	67	38	10	4		14	147
Whooping cough		13		137	27	1	4	5		187

ITALY

Influenza.—Under date of December 8, 1948, the press reported a severe outbreak of influenza in Rome. According to later official information, epidemic proportions were reported in Rome and Milan, and it was stated to be widespread not only in the Central and Southern Provinces of the mainland but also in Sardinia. Still later information stated that the epidemic had spread to the Northern Provinces.

The disease is stated to run a mild clinical course of 4 to 5 days' duration, with neuralgia and fever for 2 or 3 days. Fatal pulmonary complications were said to have been observed only among the aged. The number of deaths from bronchopneumonia had not exceeded the normal for the season. Type B virus was identified in the Sardinia laboratory.

In view of the benign character of the disease, the Italian health authorities do not regard the situation with alarm.

MAURITIUS

Poliomyelitis.—Increase recently in the incidence of acute poliomyelitis in Mauritius was indicated in telegraphic information received by the World Health Organization on December 9, 1948. During the period November 19–December 7, 22 cases were reported, of which 10 were stated to have occurred in the 3-day period December 5–7.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

British East Africa—Tanganyika—Central Province.—Plague has been reported in Central Province, Tanganyika Territory, British East Africa, as follows: Week ended October 30, 1948, 14 cases with 10 deaths; week ended November 6, 5 cases, 2 deaths.

Indochina (French)—Annam.—Reports of plague in Annam State, French Indochina, have been received as follows: Week ended November 27, 1948, 36 cases with 8 deaths; week ended December 4, 15 cases with 5 deaths; week ended December 11, 8 cases with 2 deaths.

Rhodesia (Northern).—For the week ended November 27, 1948, 8 cases of plague with 6 deaths were reported in Northern Rhodesia, and 8 cases, 6 deaths were reported during the week ended December 4, 1948.

Smallpox

British East Africa—Tanganyika.—During the week ended November 6, 1948, 65 cases of smallpox with 6 deaths were reported in Tanganyika Territory, British East Africa.

Burma—Rangoon.—For the week ended December 11, 1948, 17 cases of smallpox were reported in the city of Rangoon, Burma.

China—Amoy.—An outbreak of smallpox is reported to have occurred at Amoy, China, during the period October 17-November 27, among a group of army recruits arriving on October 6, from the interior of Fukien Province to await transport to Shanghai and North China. The first case was reported on October 17, and 5 additional cases at the beginning of November. Up to November 27 a total of 69 cases had been reported, including 3 cases among civilian workers attached to the regiment. All necessary precautions to prevent spread of the disease were stated to have been taken.

Iran—Abadan.—During the period November 6-27, 1948, 28 cases of smallpox were reported in the port of Abadan, Iran.

Iraq.—Smallpox has been reported in Iraq as follows: Week ended December 11, 1948, 132 cases with 21 deaths, including 38 cases, 8 deaths in Baghdad, and 3 cases, 2 deaths in Basra; week ended December 18, 92 cases with 26 deaths, including 23 cases, 6 deaths in Baghdad, and 3 cases, 1 death in Basra.

Rhodesia (Northern).—Smallpox has been reported in Northern Rhodesia as follows: Week ended November 27, 1948, 670 cases with 211 deaths; week ended December 4, 672 cases with 29 deaths.

Syria.—For the week ended November 27, 1948, 159 cases of smallpox were reported in Syria, including 17 cases in Aleppo, and for the week ended December 4, 149 cases were reported, including 14 cases in Damascus.

Transjordan.—During the week ended December 4, 1948, 11 cases of smallpox were reported in Transjordan.

Typhus Fever

Brazil—Porto Alegre.—During the week ended December 4, 1948, 8 cases of typhus fever with 3 deaths were reported in Porto Alegre, Brazil.

Guatemala.—During the period August 1–31, 1948, 14 cases of typhus fever with 5 deaths were reported in Guatemala, and during the period September 1–30, 39 cases with 15 deaths were reported.

Italy.—During the period September 21–30, 1948, 25 cases of typhus fever were reported in ports in Italy, 11 of which were stated to have occurred in Genoa and 6 in Rome.

Japan—Tokyo.—During the week ended November 6, 1948, 3 cases of typhus fever were reported in Tokyo, Japan.

Malay States (Federated).—During the week ended December 4, 1948, 14 cases of murine typhus fever were reported in the Malay States Federation.

Portugal—Azores—Ponta Delgada.—During the month of July, 1948, 1 fatal case of typhus fever was reported in Ponta Delgada, Azores Islands.

Yellow Fever

No reports of yellow fever were received during the current week.

DEATHS DURING WEEK ENDED DEC. 18, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Dec. 18, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	9,447	9,643
Median for 3 prior years	9,643	
Total deaths, first 51 weeks of year	467,632	469,177
Deaths under 1 year of age	740	654
Median for 3 prior years	654	
Deaths under 1 year of age, first 51 weeks of year	33,963	37,246
Data from industrial insurance companies:		
Policies in force	70,759,752	66,963,740
Number of death claims	12,140	12,712
Death claims per 1,000 policies in force, annual rate	9.0	9.9
Death claims per 1,000 policies, first 51 weeks of year, annual rate	9.2	9.2

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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Public Health Reports

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State Legislation for Minimum Standards of Hospital Maintenance and Operation

By Vane M. Hoge, M. D., and John G. Steinle*

Prior to the passage of the Hospital Survey and Construction Act (Public Law 725, 79th Cong.), August 13, 1946, only 11 States had enforceable minimum standards for hospital maintenance and operation. Of these, Georgia and Missouri limited their authority to hospitals constructed with Federal aid. These two States passed legislation late in 1945, apparently in anticipation of the passage of the Federal Act.

The following States had legislation providing for comprehensive licensure of hospitals: California, District of Columbia, Maryland, Minnesota, South Dakota, Connecticut, Maine, Massachusetts, New York.

Section 623 (d) of Public Law 725 provides:

> If any State, prior to July 1, 1948, has not enacted legislation providing that compliance with minimum standards of maintenance and operation shall be required in the case of hospitals which shall have received Federal aid under this title, such State shall not be entitled to any further allotments . . .

This meant that 41 States, in order to continuously participate in the national hospital survey and construction program, had to pass legislation for the enforcement of minimum standards of maintenance and operation.

In cooperation with the Hospital Facilities Division of the Public Health Service and the American Hospital Association, the Council of State Governments developed a model licensure statute which was made available to the various States for assistance in drafting satisfactory legislation. This model bill did not limit licensure to hospitals constructed under Public Law 725, but provided for the establishment and enforcement of standards for all hospitals. It was believed that only through such a universal act could standards be raised for all hospitals. It was also believed that licensure was the best vehicle for enforcing minimum standards.

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*Hospital Facilities Division, Public Health Service.

The Hospital Facilities Division, charged with the responsibility of administering Public Law 725, established a reference service which, upon request, made suggestions and recommendations on all legislation relative to enforcement of minimum hospital standards. This service was offered gratuitously to the States upon initial introduction of a bill, its amendment and passage by either house, and upon final approval. In addition, and in close cooperation with the American Hospital Association, expert counsel was made available to various States requesting assistance in preparing legislation. Consequently, 25 States have passed comprehensive licensure laws covering all types of hospitals. These States are:

Alaska, Arizona, Arkansas, Colorado (except Government-owned hospitals not participating under P. L. 725), Florida, Idaho, Indiana, Iowa, Kansas, Mississippi, Montana, Nebraska.

New Hampshire, New Jersey, North Dakota, Oklahoma, Oregon, Puerto Rico, Rhode Island, South Carolina, Tennessee, Utah, Virginia, West Virginia, Wyoming.

Eleven States passed laws for the enforcement of minimum standards of maintenance and operation for hospitals constructed under Public Law 725:

Illinois, Kentucky, Louisiana, Michigan, New Mexico, North Carolina, Ohio, Pennsylvania, Texas, Vermont, Wisconsin.

Four States were found to have legislation or inherent powers in existing departments for enforcement of minimum standards for hospitals constructed with Federal assistance. In each instance, in order to establish authority to enforce minimum standards of maintenance and operation an attorney general's opinion was required. These States are: Alabama, Delaware, Hawaii, Washington.

A year and a half after passage of Public Law 725, only Nevada and the Virgin Islands did not have enforceable minimum standards of maintenance and operation. However, an amendment by the Eightieth Congress provided that States subsequently passing enforceable maintenance and operation standards could be restored to eligibility for Federal funds. Both Nevada and the Virgin Islands may pass satisfactory acts in the next session of their legislatures.

The close relationship between various State acts for enforcement of minimum standards of maintenance and operation and the Hospital Survey and Construction Act is indicated by the fact that in all but three instances the same agency is charged with the responsibility for enforcing the minimum standards and also for administering the hospital survey and construction program. The three exceptions are Florida, Michigan, and New York. In a number of cases, the licensure legislation was incorporated in the same act which created the authority for administering the program.

Generally, in order to be constitutional, legislation for enforcement of minimum standards of maintenance and operation must delineate the area of administrating authority. Therefore, each State law generally includes the limits within which the discretion of the administrator or administrative agency may be exercised. Blanket authority to an administrative agency to make rules and regulations and enforce such rules would probably constitute improper delegation of legislative authority. The legislature is responsible for the enactment of laws. If an administrative agency were given the power to make regulations, without well defined limits, such agency would have virtually the lawmaking power of the legislature.

The authority of the administering agency has generally been delineated in the various statutes by the following:

a. Description and type of hospitals covered.

b. Specific delegation: To whom is the authority for establishing minimum standards of maintenance and operation specifically delegated?

c. Enforcement techniques: How is enforcement and supervision of subject hospitals accomplished? This can generally be divided into two headings: (1) by licensing; (2) by rule making and ordering.

d. Penalty: Maximum penalty determined, or the type of offense defined. Authority for exercising enforcement provisions such as by fine, injunction, or other means of penalizing an offender.

e. Appellant process: To whom may the violator appeal and in what instances? General procedure therefor. (This is occasionally defined in State statutes as "General administrative procedures acts").

For either licensing or rule making and ordering, the administering agency ordinarily is given the power to prescribe the standards for hospital maintenance and operation. Both types of agencies generally have the power of inspection to determine whether or not the standards are being met. The method of enforcement of such standards will vary, however.

Usually, the licensing agency has discretion within the limitations of the legislation to issue or deny a license on the basis of compliance with the standards. If the licensing agency's ruling is adverse, the applicant or licensee has the burden of obtaining the reversal of the decision. Usually, this is accomplished by an appeal to the courts. General experience in other licensing programs had indicated that courts are somewhat reluctant to reverse the decisions of licensing agencies, and will do so only where there is error of law or abuse of discretion.

When the rule-making or ordering agency, on the other hand, determines that its standards are not being met, it must then obtain enforcement through the courts. Ordinarily, this will be done through another agency. Generally, the State attorney general will file a complaint in the courts and seek to compel enforcement either through an injunction or by fines and other penalties. In such a proceeding, the burden of proof is on the State rather than on the hospital. The State must show that, beyond reasonable doubt, the party alleged to be in violation actually violated the regulations. If this can be proved, and if the regulations are not open to attack as being unauthorized under the law or deemed to be arbitrary, the court may issue an order requiring enforcement or imposing a fine. Such a decision, however, may be appealed to higher courts, thus entailing considerable delay; furthermore, in case of subsequent violation of the standards, the same procedure usually must be followed. In this way a defendant may, by dilatory tactics, make effective enforcement of the ordering agency's standards difficult, if not impossible.

An example of the two enforcement techniques would be in the case where an enforceable rule required that no addition may be made to an existing facility unless it was structurally sound. In the case of licensing, the agency could require the licensee to furnish blueprints and affirmatively establish that the existing structure is sound. However, in the case of rule making and ordering, it would be necessary for the administering agency to obtain blueprints and furnish evidence that the existing structure was not sound in order to prohibit an addition to an unsafe structure.

It is clear that while the licensing agency and rule making and ordering agency may have equal authority to impose standards of maintenance and operation, the former will have available a much more effective means of enforcing the standards which it adopts.

Following is a supplement summarizing each State law for the establishment and enforcement of minimum standards of maintenance and operation.

The first column lists the State, the second column, the agency administering the establishment and enforcement of minimum standards of maintenance and operation, the third column lists the scope and limitations of the authority of the administering agency, the fourth column indicates whether or not the act can generally be classified as licensing or ordering, the fifth column lists the legislative references.

State	Administering agency	Scope of authority	Licensing or ordering	Reference
Alabama	State Board of Health	Authority to make rules and regulations which shall provide standards for the construction and operation of hospitals constructed under P. L. 725 and require annual licensing and license renewals for such hospitals.	Licensing for hospitals constructed under P. L. 725.	Ala. Act No. 211, General Acts 1945; 1940 Ala. code, title 22, sec. 103; Atty. Gen. Opin., June 17, 1948.
Alaska	State Department of Health.	Comprehensive licensure law covering all hospitals in the Territory. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	Licensing	1947 New Laws, ch. 93, S. B. 79.
Arizona	do	Comprehensive licensure law covering all hospitals in the State. Licensing agency with advice of hospital advisory council establishes standards, inspects for compliance, approves plans and specifications for new construction, alterations and additions. License issued and renewed annually.	do	Ch. 130, H. B. 206, 1947.
Arkansas	do	Comprehensive licensure law covering all hospitals in the State. Licensing agency to establish standards which may include approval of plans and specifications for new construction, alteration and addition; and inspects for compliance. License issued and renewed annually.	do	Act. No. 85, Acts 1947, H. B. 109, 1947.

State	Administering agency	Scope of authority	Licensing or ordering	Reference
California	State Department of Welfare for Mental—State Department of Health for all others.	Licensing by State Department of Health of all hospitals except Federal, State or county hospitals and mental hospitals. Attorney General's opinion held that county hospitals constructed under P. L. 725 also must meet minimum standards which can be enforced. Licensing agency, with the assistance and advice of an advisory council, promulgates rules, regulations and standards, issues and renews license, inspects and enforces regulations including plans and specifications for mental hospitals inspected and supervised by State Department of Welfare.	Licensing	Deering's Calif. Code, ch. 2, par. 1400–1421; Atty. Gen. Opin., February 6, 1948; div. 6, pt. 2 of the Welfare Code.
Colorado	State Department of Health.	Duty to establish and enforce standards for operation and maintenance of hospitals, sanitoria, homes for the aged, convalescent homes, maternity homes, asylums and other similar institutions except those totally owned and operated by any government unit or agency. Such governmentally owned hospitals constructed under P. L. 725 must meet minimum standards of maintenance and operation. Such standards may be enforced.	Licensing except for government owned facilities for which ordering applies.	Sec. 5, par. 14, S. B. 82, 1947.
Connecticut	do	Any person, firm or corporation is prohibited from operating a hospital without a license. However, the provisions do not apply to any hospital	Licensing	Sec. 409 (f) of cumulative Supp. of Gen. Stat. (general hospitals); sec. 1042 (e) of 1939 Supp.

		wholly supported by the State, or to any hospital partially supported by the State which is approved by the American College of Surgeons. Separate sections provide for licensing of maternity hospitals and hospitals for mental patients. No provisions for licensing or enforcing minimum standards for tuberculosis hospitals.		(maternity); sec. 682 (c) of 1935 Supp. (mental).
Delaware	do	Power to establish and enforce minimum standards of maintenance and operation. Such power is under broad general health provisions. Standards may be enforced by injunction.	Rule making and ordering.	745, ch. 25; 779, ch. 36; 738, ch. 25, sec. 3, art. 1; 796, ch. 25; art. 21, 1935 code of Delaware; Atty. Gen. Opin., Sept. 15, 1948.
District of Columbia.	District Health Department.	No person may establish, maintain, or operate a hospital without a license. License remains in force until revoked or relinquished. Licensing agency has the power to establish and enforce minimum standards.	Licensing in name; ordering effect.	D. C. Stat. pp. 32–301.
Florid	State Board of Health	Comprehensive licensure law covering all hospitals. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	Licensing	1947 New Laws, p. 883, H. B. 257.
Georgi	do	Broad powers to supervise hospitals. Aid under P. L. 725 requires permits in accordance with minimum standards established by the State Board of Health. Hospitals to be included are all those eligible for Federal aid or all public and voluntary nonprofit institutions.	Licensing for hospitals eligible for Federal aid; ordering for all others.	Sec. 88–112 Ga. Code, Act 623, 1946 session.

State	Administering agency	Scope of authority	Licensing or ordering	Reference
Hawaii	Territorial Department of Health.	The Territory may promulgate and enforce regulations governing hospitals. This is included in the general powers of the Territory.	Rule making	Hawaii Rev. Stat., secs. 2015 and 2020; Atty. Gen. Opin., July 28, 1947.
Idaho	Department of Public Health.	Comprehensive licensure law covering all hospitals in the State. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	Licensing	1947 New Laws, S. B. 55.
Illinois	State Department of Health.	The licensing agency establishes and enforces minimum standards of maintenance and operation for hospitals constructed under P. L. 725.	do	1947 New Laws, H. B. 993.
Indiana	do	Same as Alaska for all hospitals except mental. Mental hospitals separately licensed.	do	Ch. 346, Laws 1945 as amended by ch. 173 of Laws of 1947.
	Council for Mental Health for mental patients.			Ch. 225, Laws of 1947 (mental only).
Iowa	State Department of Health.	Comprehensive licensure law covering all hospitals in the State. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	do	1947 New Laws, H. B. 465.

Kansas	State Board of Health	Comprehensive licensure law covering all hospitals in the State. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	do	1947 New Laws, p. 737, H. B. 67.
Kentucky	State Department of Health.	Establish and enforce minimum standards of maintenance and operation for hospitals constructed under P. L. 725. The powers are included in the general enabling provisions for participation in P. L. 725.	Ordering	1948 New Laws, H. B. 302; Atty. Gen. Opin., May 29, 1948.
Louisiana	State Hospital Board	Establish and enforce minimum standards of maintenance and operation for hospitals constructed under P. L. 725. The powers are included in the general enabling provisions for participation in P. L. 725	do	1948 Laws, sec. 8, Act 65. Atty. Gen. Opin., Sept. 7, 1948.
Maine	State Department of Health and Welfare.	Comprehensive licensure law covering all hospitals. License issued and renewed, based on applicant's proof of ability to meet minimum standards promulgated by licensing agency. State hospitals are exempt from these requirements.	Licensing	1945 Laws, S. B. 406.
Maryland	State Board of Health	Comprehensive licensure law covering all hospitals. License issued and renewed annually. Licensing agency establishes minimum standards for maintenance and operation.	do	1945 Laws, ch. 210.

State	Administering agency	Scope of authority	Licensing or ordering	Reference
Massachusetts	State Department of Health and State Department of Mental Health (for mental only).	Comprehensive licensure law covers all hospitals except those caring exclusively for mental patients. The licensing agency establishes minimum standards for maintenance and operation. Mental hospitals not under the direction of the State Department of Mental Health are licensed by that Department.	Licensing	Sec. 71, ch. 111, Annotated Stats. of Mass.; sec. 33 and 34, ch. 213, Annotated, Stats. of Mass. (mental only).
Michigan	State Department of Health.	With advice of Advisory Hospital Council promulgates and enforces minimum standards for hospitals constructed under P. L. 725.	Ordering	1948 extra session, H. B. 14 amending sec. 11, Act 299, Public Acts 1947.
Minnesota	Department of Health	Any person, firm, or corporation is prohibited from operating a hospital without a license. Such license must be renewed annually. The licensing agency may inspect for compliance with minimum standards for maintenance and operation. Such standards are promulgated by Department of Health with advice of a special committee.	Licensing	Ch. 549, Minn. Session Laws of 1941 amended by ch. 649, Minn. Session Laws of 1945.
Mississippi	Commission on Hospital Care.	Comprehensive licensure law covering all hospitals in the State. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	do	1948 New Laws, p. 805, H. B. 687.

Missouri	Department of Public Health.	May establish and enforce minimum standards for maintenance and operation for hospitals constructed under P. L. 725.	Ordering	Sec. 975.39, Laws of 1945.
Montana	State Board of Health	Comprehensive licensure law covering all hospitals in the State. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	Licensing	Ch. 269, Laws 1947, H. B. 235.
Nebraska	Department of Health	Comprehensive licensure law covering all hospitals in the State. Licensing agency with advice of hospital advisory council establishes standards, inspects for compliance, approves plans and specifications for new construction, alterations and additions. License issued and renewed annually.	do	1947 New Laws, p. 497, Leg. Bill 250.
Nevada	None	None	None	None.
New Hampshire	State Health Department.	Comprehensive licensure law covering all hospitals in the State License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	Licensing	Ch. 216, Laws 1947, H. B. 371.
New Jersey	Department of Institutions and Agencies.	Comprehensive licensure law covering all hospitals in the State. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of the Hospital Licensing Board.	do	Ch 340, Laws 1947.

State	Administering agency	Scope of authority	Licensing or ordering	Reference
New Mexico	State Department of Health.	With advice of Hospital Advisory Council promulgates standards for maintenance and operation of hospitals constructed under P. L. 725. Issues and renews licenses to hospitals constructed under the Act meeting such standards. Licensing agency may inspect and revoke.	Licensing hospitals constructed under P L. 725.	1947 substitute S. B. 12.
New York	do	The Department of Health has power and authority to amend, change and enforce the sanitary code, which has the full effect of law and relates to all matters of health.	Ordering	Art. 2, sec. 2-6, Public Health Law.
	State Board of Social Welfare.	The State Board of Social Welfare visits and inspects all hospitals eleemosynary in character or which receive public funds. If the Board determines patients are not being properly cared for it may issue an order to the manager of the institution requiring corrections. Such order must be approved by a Justice of the Supreme Court.	do	Art. 17, sec. 2 of N. Y. State Constitution.
	State Department of Health.	All maternity hospitals must be licensed by the State Board of Health. Power to establish standards and inspect for compliance. License must be renewed annually.	Licensing of maternity hospitals.	Art. 44, sec. 482, Penal Law.
	do	The State Department of Health has the authority to establish rules, inspect and enforce such rules in re-	Ordering	Art. 18, sec. 444; art. 19, sec. 350; art. 2, sec. 4-C Public Health Law.

		spect to State institutions for malignant diseases, the State Hospital for the Care and Treatment of Crippled Children and for all contagious disease hospitals.		
	Department of Mental Health.	The Department of Mental Health has jurisdiction, supervision and control over all mental hospitals.	do	Art. 2, sec. 11, Mental Hygiene Law.
	State Department of Health.	The Department of Health has the jurisdiction, supervision and control of all State tuberculosis hospitals. The Department is directed to issue rules and regulations with respect to such hospitals and has the power to enforce them.	do	Art. 16-A, sec. 338. Public Health Law.
	New York City Department of Hospitals.	All New York City hospitals must be licensed by the City Department of Hospitals, with the right to establish standards and inspect for compliance. City owned institutions are exempt from this requirement.	Licensing	Ch. 23, sec. 583, New York City Charter. Atty. Gen. Opin. May 14, 1948, points out all hospitals covered by enforceable standards for maint. & operation.
North Carolina	North Carolina Medical Care Commission.	Authority to establish standards for maintenance and operation, with the advice of the Hospital Advisory Council. Licenses issued annually. Licensing agency inspects for compliance. Provisions apply only to those hospitals eligible for, or which may become eligible and apply for, Federal or State funds. Other hospitals may voluntarily come under the provisions of the Act.	Licensing for hospitals eligible for aid.	Act 13-A, secs. 131-126.4, 131 126.5, 131-126.7.

State	Administering agency	Scope of authority	Licensing or ordering	Reference
North Dakota	Department of Health	A "Health Council" establishes minimum standards. The Department of Health issues licenses pursuant to such standards, inspects for compliance. Advises hospitals on all phases of hospital administration. Licenses issued and renewed annually. State owned hospitals and homes licensed by the State Board of Public Welfare are exempt from these requirements. The Department of Health renders consultation service on all phases of hospital administration to State owned facilities.	Licensing	1947 New Laws, p. 448 H. B. 52.
	State Board of Public Welfare.	Licenses homes and hospitals exclusively for the aged, infirm and unmarried mothers.		
Ohio	State Board of Health	Prescribes and enforces minimum standards for maintenance and operation of hospitals constructed under P. L. 725.	Ordering	Sec. 10, H. B. 490, 1947 New Laws.
	do	Licenses maternity hospitals	Licening	Sec. 6276, Ohio Code.
	Department of Public Welfare.	Licenses mental hospitals	do	Sec. 1890-20, Ohio Code.
Oklahoma	State Board of Health	Licensing agency establishes minimum standards, issues and renews licenses thereon, inspects for compliance all hospitals covered, except Federal and State operated mental hospitals.	do	Title 63, ch. 1, 1945 Okla. Statutes.

Oregon	do	Comprehensive licensure law covering all hospitals in the State. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	do	Ch. 188, Oregon, 1947 New Laws.
Pennsylvania	Department of Welfare	The Department of Welfare is required to establish and enforce minimum standards for maintenance and operation for hospitals constructed under P. L. 725.	Ordering	1947 New Laws, S. B. 608
Puerto Rico	Insular Department of Health.	Comprehensive licensure law covering all hospitals on the Island. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	Licensing	1948 New Laws, Act 74, H. B. 675.
Rhode Island	State Department of Public Health.	A comprehensive licensure law. The Director of the State Department of Public Health has the power to make rules and regulations for the lodging, care, and treatment of persons suffering disease, physical or mental conditions. Such Director after receiving an application for a license shall make such investigations as he deems necessary before issuing or denying a license. Licenses must be renewed annually.	do	1948 New Laws, p. 131, H. B. 966.

State	Administering agency	Scope of authority	Licensing or ordering	Reference
Washington	State Board of Health	Power to establish minimum standards as well as to establish such standards for hospitals constructed under P. L. 725 are inherent in the general supervisory powers of the State Board of Health. Failure to comply with such standards could result in an action, in that the continued operation of the violating institution constitutes a nuisance.	Ordering	Atty. Gen. Opin. August 8, 1947.
West Virginia	do	Comprehensive licensure law covering all hospitals. License issued and renewed, based on applicant's proof of ability to meet minimum standards promulgated by licensing agency. State hospitals are exempt from these requirements.	Licensing	W. Va. 1947 New Laws, p 11, S. B. 51.
Wisconsin	do	State Board of Health required to prescribe minimum standards for maintenance and operation of Federally aided hospitals. Legal authority exists for enforcement of these standards.	Ordering	Ch. 235, Laws of 1947.
Wyoming	State Department of Health.	Comprehensive licensure law covering all hospitals in the State. License shall be used and renewal based on applicant's affirmative evidence of ability to comply with standards developed by licensing agency with advice of Advisory Hospital Council.	Licensing	1948 special session, H. B. 6.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 1, 1949

Following last week's decline, the incidence of influenza increased slightly to a total for the current week of 2,821 cases, as compared with 2,165 last week, 2,644 for the next earlier week, and a 5-year (1943–47) median of 3,835. Five States reporting an aggregate of 2,453 cases (last week 1,858), are as follows (last week's figures in parentheses): Virginia 253 (398), South Carolina 413 (131), Arkansas 267 (158), Texas 1,315 (1,032), Arizona 205 (139). A total of 36,270 cases has been reported since July 31, approximate average seasonal low date, as compared with 36,696 for the same period last year, which latter figure was also the 5-year median for the period.

Of the total of 7,050 cases of measles reported currently (last week 6,147, 5-year median 2,723), the New England, Middle Atlantic, South Atlantic, and West South Central areas reported 5,008 (last week 4,139), and 3,092 cases occurred in 4 States, as follows (last week's figures in parentheses): Massachusetts 1,102 (1,017), New York 512 (322), Maryland 406 (402), and Texas 1,072 (892). No other State except Pennsylvania (290) reported more than 257 cases. Since September 4, approximate average date of seasonal low incidence, 52,393 cases have been reported, as compared with 30,217 for the same period last year and a 5-year median of 26,124.

Of the total of 164 cases of poliomyelitis reported currently (last week 203, 5-year median 76), only 2 States (California 62, last week 68 and Texas 16, last week 8) reported more than 9 cases. Of 27,677 cases reported during the past 52 weeks, California reported 5,560, North Carolina 2,509, Texas 1,780, New York 1,486, Minnesota 1,423, Iowa 1,242, Ohio 1,169, and Illinois 1,122.

During the week 4 cases of smallpox were reported, 1 each in North Dakota, South Dakota, Nebraska, and Montana. California reported 1 case of anthrax, and Georgia 1 case of Rocky Mountain spotted fever.

Deaths recorded during the week in 93 large cities in the United States totaled 10,642, as compared with 8,789 last week, 10,418 and 11,928, respectively, for the corresponding weeks of 1947 and 1946, and a 3-year median of 10,418. The total for the year to date is 487,063, as compared with 488,486 last year. Infant deaths for the week totaled 669, last week 600, 3-year median 725. The cumulative figure is 35,232, same period last year 38,620.

Telegraphic case reports from State health officers for week ended Jan. 1, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	2	----	1	257	----	12	----	----	14	----	----	----	5	----
New Hampshire	----	----	----	10	1	1	----	----	1	----	----	----	----	----
Vermont	----	----	----	254	----	----	1	----	18	----	----	----	3	----
Massachusetts	15	----	----	1, 102	3	32	----	----	196	----	1	2	67	----
Rhode Island	2	----	----	45	----	5	----	----	5	----	----	1	4	----
Connecticut	----	----	----	51	2	28	----	----	26	----	----	----	3	----
MIDDLE ATLANTIC														
New York	10	----	[b] 3	512	8	228	9	----	[c] 166	----	----	4	89	5
New Jersey	1	----	2	206	4	81	1	----	83	----	----	----	27	2
Pennsylvania	7	1	(b)	290	5	----	1	----	113	----	----	2	46	3
EAST NORTH CENTRAL														
Ohio	11	----	2	58	4	101	7	----	292	----	4	----	41	23
Indiana [d]	5	----	1	28	----	1	----	----	39	----	----	1	4	20
Illinois	1	----	3	21	3	117	2	----	91	----	6	1	19	3
Michigan [a]	----	----	----	218	2	28	3	----	172	----	----	1	28	1
Wisconsin	----	----	3	169	1	2	1	----	82	----	----	----	19	----
WEST NORTH CENTRAL														
Minnesota	2	1	----	2	5	9	9	----	43	----	----	----	----	----
Iowa	1	----	----	8	2	2	8	----	36	----	----	----	3	3
Missouri	7	----	5	127	2	19	2	----	28	----	7	3	7	----
North Dakota	1	----	3	28	----	----	1	----	14	1	----	----	2	----
South Dakota	----	----	----	2	1	1	----	----	4	1	----	----	----	----
Nebraska	----	----	45	3	----	----	[1] 1	----	11	1	----	----	----	----
Kansas	----	----	2	24	----	8	1	----	20	----	1	----	9	----
SOUTH ATLANTIC														
Delaware	1	----	1	6	----	----	----	----	1	----	----	----	----	----
Maryland [a]	4	----	1	406	1	31	1	----	16	----	1	----	9	----
District of Columbia	1	----	----	22	----	23	----	----	6	----	----	----	2	----
Virginia	7	----	253	253	1	57	----	----	15	----	3	1	18	2
West Virginia	3	----	50	----	----	2	----	----	15	----	----	1	5	----
North Carolina	6	----	----	94	2	----	6	----	26	----	2	----	25	----
South Carolina	9	----	413	31	2	121	1	----	4	----	7	1	19	4
Georgia	8	----	16	147	----	10	----	1	21	----	2	2	----	6
Florida	7	----	15	69	1	20	6	----	8	----	----	----	3	3

EAST SOUTH CENTRAL														
Kentucky	9	----	----	60	----	21	2	----	43	----	----	1	12	21
Tennessee	10	----	56	59	6	44	2	----	58	----	4	1	9	----
Alabama	13	----	18	234	1	37	1	----	12	----	----	----	12	6
Mississippi [a]	5	----	19	14	1	32	2	----	14	----	1	3	8	----
WEST SOUTH CENTRAL														
Arkansas	3	----	267	152	1	47	1	----	6	----	2	----	6	3
Louisiana	2	1	13	15	1	61	3	----	6	----	4	3	----	----
Oklahoma	8	----	30	14	----	12	1	----	18	----	----	----	4	1
Texas	22	----	1,315	1,072	3	224	16	----	42	----	1	3	62	17
MOUNTAIN														
Montana	----	----	6	----	1	----	1	----	5	1	----	----	----	----
Idaho	4	----	2	55	1	13	1	----	[c] 28	----	----	----	5	----
Wyoming	----	----	----	3	----	2	----	----	1	----	----	----	----	----
Colorado	4	----	25	53	----	33	----	----	10	----	----	----	8	----
New Mexico	----	----	3	66	1	21	----	----	12	----	----	----	----	----
Arizona	2	----	205	109	----	22	2	----	4	----	----	----	6	----
Utah [a]	2	----	----	179	1	2	3	----	3	----	----	----	4	----
Nevada	----	----	----	----	----	----	----	----	----	----	----	----	----	----
PACIFIC														
Washington	----	----	2	173	2	5	5	----	46	----	----	1	1	----
Oregon	2	----	13	244	1	23	1	----	14	----	----	1	9	----
California	6	----	27	205	10	30	62	----	47	----	----	3	17	9
Total	202	3	2,821	7,161	80	1,568	164	1	1,935	4	46	35	619	----
Median, 1943-47	300	8	3,835	2,723	162	----	76	1	2,211	3	29	45	1,570	----
Year to date, 52 weeks	9,724	564	175,085	603,918	3,280	----	[1] 27,677	523	78,314	65	1,049	3,592	72,956	----
Median, 1943-47	14,126	626	367,868	602,085	7,999	----	13,734	467	140,475	349	818	4,875	128,554	----
Seasonal low week-ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept. 18	----	(11th) Mar. 20		(32d) Aug. 14	(35th) Sept. 4	----	(11th) Mar. 20	(39th) Oct. 2	----
Since seasonal low week	5,114	----	36,270	52,394	844	----	[1] 27,327	----	22,698	15	----	3,119	10,088	----
Median, 1943-47	7,566	----	36,696	26,124	1,504	----	13,337	----	38,571	76	----	4,261	26,018	----

---

[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever, currently reported separately, as follows: South Carolina, 1, Georgia, 1; Washington, 1; Oregon, 1; California, 1. Salmonella infections, not included, were reported as follows: Massachusetts, 2; New York, 2.

Amebiasis: California, 1 case.

Alaska: No cases to report.

Territory of Hawaii: Diphtheria, 1; influenza, 1; measles, 326; lobar pneumonia, 1.

[1] Delayed reports: Poliomyelitis, Nebraska, 10 cases; Iowa, 19; typhoid fever, Iowa, 3.

Plague

Indochina (French)—Vientiane.—During the week ended December 25, 1948, 1 case of plague was reported in Vientiane (Laos State), French Indochina.

Smallpox

China—Amoy.—During the period December 1–20, 1948, 127 cases of smallpox were reported in Amoy, China.

Iraq.—For the week ended December 25, 1948, 38 cases of smallpox were reported in Iraq, including 3 cases in Baghdad and 3 cases in Basra.

Syria—Damascus.—During the week ended December 11, 1948, 25 cases of smallpox were reported in Damascus, Syria.

Transjordan.—During the week ended December 18, 1948, 11 cases of smallpox were reported in Transjordan.

Typhus Fever

Germany—United States Zone.—During the week ended November 27, 1948, 3 cases of typhus fever (murine type) were reported in the Bremen area of the United States Zone of Germany.

Yellow Fever

No reports of yellow fever were received during the current week.

DEATHS DURING WEEK ENDED DEC. 25, 1948

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Dec. 25, 1948	Corresponding week, 1947
Data for 93 large cities of the United States:		
Total deaths	8,789	8,891
Median for 3 prior years	9,380	
Total deaths, first 52 weeks of year	476,421	478,068
Deaths under 1 year of age	600	649
Median for 3 prior years	649	
Deaths under 1 year of age, first 52 weeks of year	34,563	37,895
Data from industrial insurance companies		
Policies in force	70,740,929	66,936,951
Number of death claims	12,153	8,896
Death claims per 1,000 policies in force, annual rate	9.0	6.9
Death claims per 1,000 policies, first 52 weeks of year, annual rate	9.2	9.2

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Public Health Reports

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Statistical Studies of Heart Disease, III

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Public Health Reports

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Metopon Hydrochloride

An Experiment in Clinical Evaluation

By Nathan B. Fddy, *Principal Pharmacologist*[1]

The Committee on Drug Addiction of the National Research Council recommended in 1946 that the new morphine derivative, Metopon hydrochloride (figure 1) be made available to physicians subject to certain restrictions and under the Committee's supervision. This recommendation was based upon preliminary trials, laboratory and clinical (*1*, *2*, *3*), which indicated that the advantages of Metopon were relative freedom from side-effects, analgesia with little sedation, and slower development of tolerance and addiction than with morphine and other of its derivatives.

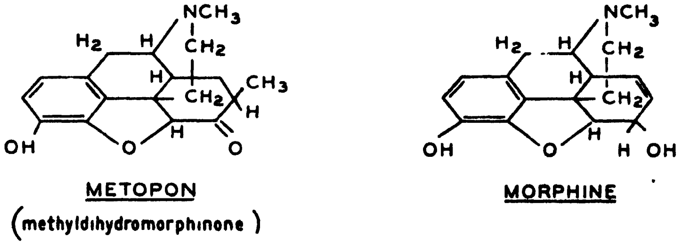


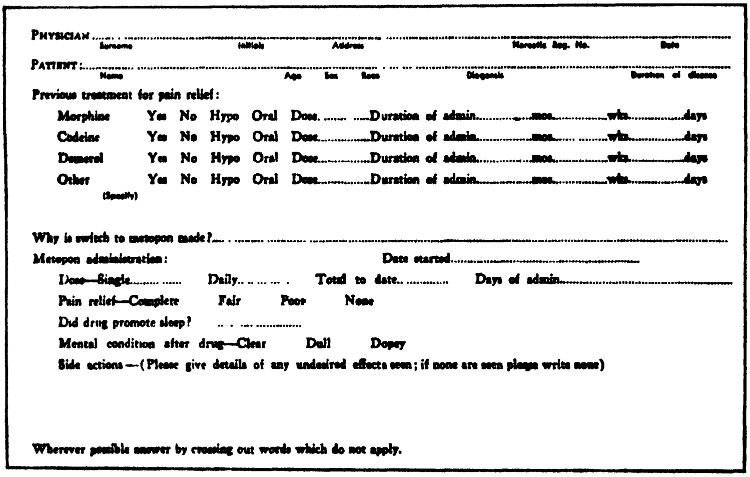
Figure 1

The recommendation resulted in the issuance of special licenses by the Federal Security Agency, assignee of the patent (*4*), to Mallinckrodt Chemical Works, Merck and Company, and New York Quinine and Chemical Works, as manufacturers, and to Parke, Davis and Co., and Sharp and Dohme, Inc., as distributors. The licenses specified that the drug be put up in capsule only for oral administration; that it be sold on Narcotic Order to the attending physician only; that all orders be subject to acceptance by the Committee; that the use of the drug be limited to terminal cancer cases; that the physician's statement accompanying an order must satisfactorily indicate fulfillment of that restriction, and that the physician would be expected to report back to the Committee on the use of the drug.[2]

---

[1] From Experimental Biology and Medicine Institute, National Institutes of Health.

Under these conditions Metopon hydrochloride came on the market May 15, 1947, and continued to be subject to restriction until June 15, 1948, when supervision by the Committee was terminated and the drug was made available on prescription like other narcotics. It continues to be offered, however, in capsule form only for oral administration and to be recommended for the treatment of chronic pain where an opiate is indicated.



PHYSICIAN ....
Surname Initials Address Narcotic Reg. No. Date

PATIENT: ....
Name Age Sex Race Diagnosis Duration of disease

Previous treatment for pain relief:

Morphine Yes No Hypo Oral Dose............Duration of admin............mos.............wks.............days
Codeine Yes No Hypo Oral Dose............Duration of admin............mos.............wks.............days
Demerol Yes No Hypo Oral Dose............Duration of admin............mos.............wks.............days
Other Yes No Hypo Oral Dose............Duration of admin............mos.............wks.............days
(Specify)

Why is switch to metopon made?..
Metopon administration: Date started..
Dose—Single............ Daily............ Total to date............ Days of admin............................
Pain relief—Complete Fair Poor None
Did drug promote sleep? ....
Mental condition after drug—Clear Dull Dopey
Side actions—(Please give details of any undesired effects seen; if none are seen please write none)

Wherever possible answer by crossing out words which do not apply.

Figure 2. Protocol card used for case reports

The author acted for the Committee in carrying out its program of supervision, corresponding with physicians, authorizing the filling of orders which met the conditions outlined, seeking, receiving and analyzing reports, and preparing finally a resumé of the program, presented here.[3]

The program entailed correspondence with 3,604 physicians. Of these, 114 did not complete an order for Metopon. Thirty-six initial orders were rejected because of insufficient information furnished about intended use, or because the drug was requested for use other than in cancer patients, or because of technical inaccuracy, the physician failing to supply a corrected form. All but 415, about 12 percent, of physicians ordering subsequently replied in some fashion with respect to their patient or patients and their use of the drug. To accomplish this result, a letter was written to each physician at the time of his order as well as thousands of follow-up letters later; some 2,000 letters were written reminding physicians that a report had not yet been received. Nine hundred and four physicians re-ordered Metopon and 42 percent of this number re-ordered more than once. Three hundred and three new patients are specifically referred to in placing of these re-orders.

---

[2] The expenses of the program of supervision of Metopon distribution by the Committee on Drug Addiction of the National Research Council were defrayed by a grant from the American Cancer Society and by contributions from Parke, Davis, and Company and Sharp and Dohme, Inc.

[3] A report on the first six months of the Metopon program was published in J. A. M. A., 137: 365-367 (1948).

With respect to all orders, the physicians indicated they intended to use or had used Metopon for 5,625 patients. They reported back on 4,460. Of these, the disease had so far advanced in 425 that death occurred before the drug was received. It was reported that in 314 others the drug was not used; usually the patient had sought other medical care. Forty-nine reports must be omitted because, although attempted, oral medication was impractical on account of difficulty in swallowing or vomiting from the disease which prevented retention of anything taken orally. There remain 3,672 reports which are the basis of the following analysis. Most of these were received on the protocol card provided (figure 2).

Table 1 summarizes the reasons given by physicians for trial of Metopon and other pertinent information about the patients. Table 2 summarizes all reports with respect to dosage and effects, and table 3 lists the side-effects incident to the administration of Metopon.

Considering the case reports as a whole and the data presented in tables 2 and 3, there are several reasons against acceptance of this data as a true measure of Metopon's effectiveness:

1. *Brief inadequate trial:* In 560 reported cases trial of Metopon was for 3 days or less. In some of these the report was obviously an early one on a patient for whom the drug was being continued. Physicians were urged to report early in order that, if necessary, comment or

TABLE 1.—*Reasons given for trial of Metopon and data on previous narcotic experience*

	Cases
To avoid hypodermic administration	632
Inadequacy of pain relief measures being employed, usually indicating tolerance to previous medication	1902
Nausea and/or vomiting with previous medication	490
Depression with previous medication	194
Side-effects with previous medication, not specified but probably, as a rule, including nausea	120
To avoid addiction	122
To avoid morphine	69
Trial, no other specific reason	643
No previous narcotic administration	170
Previous narcotic administration for 6 weeks or less	608
Previous narcotic administration for 2 months or more	2388
Previous morphine, Pantopon or Dilaudid administration for 2 months or more	1809

TABLE 2.—*Dosage, duration and effect of Metopon administration*

	Cases	Percent
Dosage:		
3.0 mg	1,117	30.4
6.0 mg	1,204	32.8
9.0 mg	716	19.5
>9.0 mg	67	1.8
No report	568	15.4
Administration 3 days or less	560	15.2
Administration 25 days or more	797	21.7
Deaths within 10 days of beginning administration	134	3.6
Administration discontinued, account dependence on previous medication	343	9.3
Degree of pain relief:		
Complete	827	22.5
Fair	1,256	34.2
Poor	1,008	27.4
None	581	15.8
Sleep following administration	938	27.4
Sleep attributed by physician to relief of pain	[1] 78	2.1
No sleep attributable to Metopon	2,555	74.8
Mental condition:		
Clear	2,518	73.0
Dull	640	18.7
Dopey	186	5.4
Confused	33	0.9
Unchanged	28	0.8
No side-effects	3,036	82.4

[1] Included in both preceding and following items.

TABLE 3.—*Side effects incident to Metopon administration*

	Cases	Percent
Total	636	17.3
Nausea:		
Usually with vomiting	385	10.4
With previous medication (490), occurring with Metopon	40	
Due to disease	54	
Due to withdrawal from previous medication	182	
Apparently medication	149	4.0
Abstinence signs:		
From previous medication disappearing during continuing Metopon administration	50	
Other side effects:		
Agitation [1]	42	
Sweating	27	
Headache	25	
Dizziness	25	
Restlessness [2]	24	
Burning in stomach	20	
Disturbing dreams and/or hallucinations	19	
Diarrhea, usually abstinence sign	17	
Euphoria	13	
Dryness of mouth	12	
"Hotflashes" or general burning sensation over body	11	
Anorexia	7	
Tinnitus	7	
Difficulty in urination and/or anuria	5	
Itching	4	
General feeling of numbness	3	
Urticaria	2	
Precordial distress	2	
Hiccough	2	
Edema of face	1	
Allergic reaction	1	
"Floating" sensation	1	
Cyanosis	1	
Dyspnoea	1	
Diuresis	1	
Total	271	7.3

[1] Agitation due to lack of satisfaction of psychic dependence on previous medication.

[2] [illegible] to lack of satisfaction of psychic dependence, lack of sedative effect, or lack of pain relief.

advice might be offered with respect to dosage, etc. In most instances administration terminated within 3 days. Sometimes the patient was very near death when the drug was tried. More often the patient was already dependent upon another narcotic and demanded prompt return to it because Metopon did not satisfy the dependence, whether or not pain was relieved and whether or not physical signs of dependence appeared. Table 4 presents the results reported for these brief trials and percentages for all effects from table 2, corrected by subtracting the results of the brief trials.

2. *Dosage:* Previous observations (*3*) had indicated that the minimal analgesic dose of Metopon for severe clinical pain would be about 6.0 mg. As with other analgesics a larger dose may be required in some instances, especially for very severe pain. Also, if tolerance develops the dose will need to be increased. Since it is desirable in any case and at any time to keep the dose at the lowest level which will afford adequate pain relief, Metopon was put up in capsules each containing 3.0 mg. of the drug as hydrochloride for the convenience of physicians in attaining this end. The recommended starting dose was two capsules (6.0 mg.) and emphasis was placed on subsequent adjustment of the dose to the need of the case. Excluding the cases for whom the dose used was not reported, in 35.9 percent the capsules were taken singly; in 38.7 percent the 6.0 mg. dose was used, in 23.0 percent the dose started at 9.0 mg. or was increased to that level within a few doses, and in only 2.1 percent was the dose greater than 9.0 mg.

TABLE 4.—*Effect of Metopon in trials of 3 days or less*

	Cases	Percent [1]	Corrected percent [2]
Degree of pain relief:			
Complete	41	22.5	25.2
Fair	86	34.2	37.5
Poor	179	27.4	26.0
None	254	15.8	10.4
Sleep following administration	66	27.4	30.1
No sleep attributable to administration	457	74.8	72.5
Mental condition:			
Clear	345	73.0	75.8
Dull	117	18.7	18.1
Dopey	36	5.4	5.2
Confused	12	0.9	0.7
Unchanged	10	0.8	0.6
No side effects	375	82.4	85.5
Total untoward reactions	185	17.8	14.4
Nausea	124	10.4	8.2
Disease	10		
Withdrawal from previous medication	73		
No cause other than medication apparent	41	4.0	3.4
Other side effects	61	7.8	6.6

[1] From table 2.
[2] Corrected for brief trials.

In table 5, the data on the effect of Metopon has been reclassified according to dose. The over-all effect of the 3.0 and 6.0 mg. doses is very similar. Probably this means that physicians tended to prescribe the smaller dose for the patients with less pain, and that in many cases of mild chronic cancer pain 3.0 mg. of Metopon may constitute a satisfactory analgesic dose. The effect of 9.0 mg. appears to be less than that of smaller doses. It has already been shown that about two-thirds of all patients had received other narcotics for 2 months or more, were probably tolerant to and were usually dependent upon such previous medication. It was these tolerant individuals almost always on whom the 9.0 mg. dose was tried and too often failed indicating, we believe, cross-tolerance between Metopon and other narcotics.

TABLE 5.—*Effect according to dose, all cases*

	3.0 mg.		6.0 mg.		9.0 mg.	
	Cases	Percent	Cases	Percent	Cases	Percent
Pain relief:						
Complete	271	24.2	341	28.3	107	14.9
Fair	407	36.4	423	35.1	249	34.7
Poor	269	24.0	280	23.2	220	30.7
None	170	15.2	162	13.4	140	19.5
Sleep promoted	392	35.2	317	27.0	130	18.4
No sleep	720	64.7	854	72.9	570	81.4
Mental condition:						
Clear	785	73.2	881	74.6	542	77.7
Dull	205	19.1	217	18.4	109	15.6
Dopey	61	5.7	59	5.0	36	5.1
Confused	7	0.6	13	1.1	6	0.8
Unchanged	13	1.2	9	0.7	3	0.4
No side effects	915	81.9	998	82.8	601	83.9
Nausea	136	12.1	118	9.8	69	9.6
Due to disease	21		20		7	
Due to withdrawal of previous medication	70		64		37	
No cause other than medication apparent	45	4.0	34	2.8	25	3.4
Other side-effects[1]	65	5.8	90	7.4	46	6.4

[1] Including agitation and other abstinence signs.

Among all cases reported, there are only 170 to whom no previous narcotic had been administered. In 74 of these the dose was 3.0 mg., in 53 it was 6.0 mg., in 17 it was 9.0 mg., and in the others the dose used was not reported. The results in these cases are classified in table 6 according to dose and show distinctly better relief with the 6.0 mg. than with the 3.0 mg. dose. There were two failures with the 9.0 mg. dose, but the group is too small to justify a conclusion on this point.

3. *Tolerance and addiction to previously administered narcotics:* Of the 3,169 patients for whom information on this point has been re-

ported, only 170 (5.3 percent) had received no narcotic previous to Metopon, 608 (19.2 percent) had taken other narcotics for 6 weeks or less, and 2,388 (75.3 percent) had been taking other narcotics for 2 months or more. Of this last group 1,309 had taken morphine and/or Dilaudid for 2 months or more, and 623 patients had taken Demerol for 2 months or more. Incidentally, addiction to Demerol was admitted in 12 patients and probable from the record in 53 others. In six of admitted addiction cases, Demerol was reported to be the only narcotic used.

Tolerance to morphine and related substances may appear within 6 weeks but will not, as a rule, become marked within that time. Some tolerance to the analgesic effect of morphine, etc., will, however, almost always appear within 2 months and will increase with longer periods of administration. Cross-tolerance between morphine and its derivatives has been demonstrated repeatedly. Cross-tolerance between other narcotics and Metopon will be indicated by diminishing effect of the same dose of Metopon given after longer and longer periods of other narcotic administration. This is clearly shown in table 7 where the results of 6.0 mg. doses have been grouped according to the three categories of previous medication.

TABLE 6.—*Effect according to dose; cases receiving no narcotic previous to Metopon*

Effect	3.0 mg.		6.0 mg.		9.0 mg.	
	Cases	Percent	Cases	Percent	Cases	Percent
Pain relief:						
Complete	35	47.3	31	58.4	7	41.1
Fair	27	36.4	18	33.9	6	35.2
Poor	8	10 8	2	3 7	2	11.7
None	4	5.4	2	3.7	2	11.7
Sleep following administration	36	49.3	22	41.5	9	52.9
No sleep	37	50.6	31	58.4	8	47.0
Mental condition:						
Clear	57	78 0	44	83.0	17	100.0
Dull	12	16.4	7	13.2		
Dopey	3	4 1	2	3.7		
Confused	1	1.3				
No side-effects	72	97.3	45	84.9	17	100.0
Nausea	2	2.7	[2] 4	7 5		
Nausea due to disease	[1] 2		3			
Other side-effects	0		4	7.5		

[1] One attributed to disease, other to X-ray treatment.

[2] In the one case of nausea not attributed to disease physician said, "When sufficient drug was taken to relieve pain stomach was so upset drug had to be discontinued."

It is noteworthy that sleep after Metopon administration was reported most frequently in the group having had no previous narcotic. This may indicate cross-tolerance to sedative effect but such an explanation seems unlikely because retention of mental clarity was also greatest in this group. The high incidence of sleep would seem to be, therefore, an indirect result of pain relief.

TABLE 7.—*Effect of 6.0 mg. doses of Metopon grouped according to previous narcotic medication*

Effect	No previous administration		6 weeks or less		2 months or more	
	Cases	Percent	Cases	Percent	Cases	Percent
Degree of pain relief:						
Complete	31	58.4	87	38.4	199	24.0
Fair	18	33.9	73	32.3	297	35.8
Poor	2	3.7	43	19.0	209	25.2
None	2	3.7	23	10.1	124	14.9
Sleep	22	41.5	64	28.4	204	24.8
No sleep	31	58.4	161	71.5	617	75.1
Mental condition:						
Clear	44	83.0	175	77.7	615	74.9
Dull	7	13.2	38	16.8	157	19.1
Dopey	2	3.7	6	2.6	42	5.1
Confused	--------	--------	6	2.6	7	0.8
No side-effects	45	84.9	206	91.1	661	79.7
Nausea:						
Usually with vomiting	4	7.5	11	4.8	97	11.7
Due to disease	3	--------	3	--------	12	--------
Due to withdrawal from previous medication	--------	--------	2	--------	61	--------
No cause other than medication	1	1.8	6	2.6	24	2.8
Other side-effects	4	7.5	11	4.8	76	9.1

Nausea and other side-effects were reported most frequently in the group having previously taken the most narcotic. However, if the figure for the incidence of nausea is corrected by subtracting the cases where the symptom is attributable to the disease or clearly an abstinence phenomenon, there is little difference in the occurrence of nausea in the three groups.

Metopon substitutes for morphine in a known addiction poorly and incompletely (*5*). In other words, substitution of Metopon for morphine in a case of addiction to the latter may permit the appearance of abstinence phenomena because psychic and physical dependence have not been satisfied. Physicians have referred specifically to the existence of addiction in 154 of the patients for whom Metopon was tried; their reports indicate clearly the presence of addiction in at least 513 other cases. Metopon administration was discontinued because of the addiction in 343 instances, usually, but not always, because of the appearance of physical signs of abstinence. In almost 50 percent of all cases where nausea and vomiting appeared during Metopon administration these symptoms are attributable to withdrawal of the previous narcotic (*see* table 2). Some of the other symptoms listed in table 3 as side-reactions undoubtedly are of similar origin.

Metopon nevertheless must have to a considerable degree satisfied existing dependence, or the incidence of nausea, vomiting, and other abstinence signs would have been much higher. The reports include 50 in which mild abstinence symptoms are specifically described as appearing at the outset of Metopon substitution for morphine or other narcotic and disappearing within a few days of continuing Metopon administration. Physicians have found also that abstinence symptoms are least troublesome if the previous narcotic is rapidly reduced instead of discontinued abruptly during the first few days of Metopon administration, but the record as a whole certainly indicates that results are significantly better when Metopon is employed early before tolerance to and dependence on other narcotics have developed.

Metopon administration for 4 weeks or more has been reported in 500 cases. There was no apparent tolerance in 381 or 76 percent, distributed as follows:

Period of administration, days:	*Cases*
28 to 32	73
33 to 60	154
61 to 90	86
91 to 120	35
121 to 330	33

Diminishing effect of the drug after administration for 1 week or more is reported 170 times as follows:

Period of administration, days	*Cases*
7	11
8 to 21	27
22 to 30	43
31 to 60	56
61 to 90	16
91 to 120	11
>120	6

The diminishing effect was reported as such, the dose remaining unchanged or as an increase in dose to maintain an effect. The evidence as a whole indicates slower development of tolerance than is to be expected with similar administration of morphine.

Canadian distribution of Metopon

With the approval of Canadian narcotic control authorities, Parke, Davis and Company's Canadian branch obtained a special license for the distribution of Metopon to Canadian physicians. The conditions of distribution were exactly the same as in the United States—limitation to cancer patients, request for report on use, and supervision of the distribution by the author acting for the Committee on Drug Addiction. As in the United States, the drug was made available for oral use only, but for comparison it was marketed as a scored tablet. Each tablet contained 8 mg. of Metopon hydrochloride.

Metopon became available in Canada in December 1947. Up to June 15, 1948,[4] 200 Canadian physicians sought the drug for 256 patients. Six orders were rejected because the case was not one of cancer. Forty-four physicians have not reported on their use of the drug. Reports on 156 patients are available for analysis.

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[4] Metopon is now available on prescription like other narcotics in Canada as in the United States.

Only 5 patients had received no previous narcotic; 27 had received other narcotics for 6 weeks or less, 109 for 2 months or more. No information is given in 15 cases about previous use of other narcotics.

Table 8 summarizes the results reported for all cases and for those patients having had no previous narcotic or other narcotics for 6 weeks or less. The results are essentially the same for both effectiveness and incidence of side-reactions as for administration of Metopon in capsule. Again, effectiveness is reduced and side-reactions (nausea) increased by extensive previous narcotic administration. The conclusion is obvious that Metopon can be administered orally as well in tablet form as in capsule, and no advantage seems to follow the use of 8 mg. instead of 6 mg. as the usual dose.

TABLE 8.—*Results of Metopon administration, Canadian reports*

	All reports		No previous narcotic or narcotics for 6 weeks or less	
	Cases	Percent	Cases	Percent
Dosage:				
4.0 mg	6	3.8	2	6.2
8.0 mg	131	83.9	27	84.3
12.0–16.0 mg	13	8.3	1	3.1
No report	6	3.8	2	6.2
Degree of pain relief:				
Complete	36	23.7	11	34.3
Fair	53	33.9	12	37.5
Poor	36	23.7	2	6.2
None	30	19.2	7	21.5
Sleep	43	29.0	13	40.6
No sleep	105	70.9	19	59.3
Mental condition:				
Clear	113	75.8	26	81.2
Dull	22	14.7	4	12.5
Dopey	13	8.7	2	6.2
Confused	1	0.6		
No side-effects	127	81.4	27	84.3
Side-effects:				
Nausea:				
Usually with vomiting	21	13.4	2	6.2
With previous medication (21)	2			
Due to disease	5		2	
Due to withdrawal from previous medication	8			
Apparently due to medication	8	5.1		
Other side-effects:				
Dizziness	3		1	
Agitation [1]	2			
Sweating	2			
Anorexia	1			
Headache	1			
Unpleasant dreams	1		1	
"Gone feeling"	1		1	
Total	11	7.0	3	9.3

[1] Probably related to psychic dependence on previous medication.

Summary

Metopon hydrochloride is an effective oral analgesic for chronic pain, the use of which is accompanied by a high incidence of mental clarity and a low incidence of side-reactions.

Since cross-tolerance between other narcotics and Metopon seems to exist and since the latter does not fully satisfy an established dependence, the use of Metopon is more satisfactory in cases receiving little or no previous narcotic medication.

Tolerance to Metopon develops more slowly than tolerance to morphine.

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(*4*) Small, L., and Fitch, H. M.: U. S. Patent 2,178,010. Oct. 31, 1939.

(*5*) Himmelsbach, C. K.: Studies of certain addiction characteristics of (a) dihydromorphine (Paramorphan), (b) dihydrodesoxymorphine-D (Desomorphine), (c) dihydrodesoxycodeine-D (Desocodeine), and (d) methyldihydromorphinone (Metopon) J. Pharmacol. & Exper. Therap. **67**: 239 (1939).

Statistical Studies of Heart Disease

III. Heart disease associated with other major causes of death as primary or contributory cause

By Mary Gover, *Biostatistician, Division of Public Health Methods, Public Health Service*

Diseases of the heart as a cause of death occur mainly among persons over 45 years of age; they are usually of a chronic nature and are frequently associated with other chronic and degenerative causes of death characteristic of later life. Expressed as a percentage of total contributory deaths, heart disease ranks first as a contributory cause, arteriosclerosis second, and intracranial lesions of vascular origin third. Because of its importance as a contributory cause of death it was thought advisable, in connection with these studies of heart disease, to examine the occurrence and extent of contributory, and also of primary heart disease mortality. Data are available from special cross-tabulations of associated causes made by the National Office of Vital Statistics for selected years.

This is the third in a series of studies dealing with the statistics of heart disease morbidity and mortality. The papers are prepared jointly by the Division of Public Health Methods and the National Office of Vital Statistics, with the cooperation of the Division of States Relations.

The certificate of death in use at the present time varies from State to State. However, that portion relating to certification of cause of death by the physician is relatively uniform and in conformity with suggestions outlined by the National Office of Vital Statistics. In general, space is provided for the certification of the immediate cause of death and one or more underlying causes to be recorded in order of time sequence stated in reverse order of occurrence from the immediate cause of death.

Somewhat less than half the death certificates filed each year report a single or sole cause of death only. The remainder contain two or more associated causes which are later coded as the primary and one contributory cause of death. Allocation to primary and contributory cause has been made in the past in accordance with procedures specified in the Manual of Joint Causes of Death.

The Manual of Joint Causes of Death is an outgrowth of rules developed through practical experience and embodied in the code of causes of death in use in France and England prior to the establishment of the United States Death Registration Area in 1900. The United States Manual was first published in 1914, with changes in 1925, 1933, and 1939 necessitated by revisions of the International List of Causes of Death. Cross-tabulations of deaths allocated as primary and contributory cause do not show causes of death in sufficient detail for a complete comparison with corresponding preferences stated in the Joint Cause Manual. For all practical purposes, however, the statement can be made that allocation of deaths to primary and contributory cause has, in the past, been largely in accordance with this arbitrary standard.[1]

Cross-tabulations of primary and one associated cause of death have been made by the National Office of Vital Statistics for the years 1917, 1925, 1936, and 1940. In these tabulations every cause of death is listed vertically as a primary cause and horizontally as a contributory cause of death. Each row of figures gives the numbers of deaths due to a primary cause tabulated according to contributory causes; each column of figures gives the numbers of deaths for each contributory cause tabulated according to primary cause. Of the total number of reported deaths allocated to heart disease as a sole, primary, or contributory cause[2] in 1940, 44 percent were designated as due to some form of heart disease as sole cause, 33 percent were allocated to heart disease as primary cause, and 23 percent as contributory to some other cause of death.

Tabulated mortality from all forms of heart disease (sole or primary) was 293 per 100,000 in 1940; 45 percent of this mortality was certified to a form of heart disease as the only cause, and 55 percent was allocated to heart disease as primary with an accompanying contributory cause. The principal contributory causes so allocated in 1940 (figure 1) are diseases of the arteries, related forms of heart disease, senility, and pneumonia of the older ages. These are numerically large causes of death; heart disease, however, is also allocated to a somewhat lesser extent as primary over many other specific causes. The total primary heart disease rate of 161 per 100,000 is not greatly in excess of the contributory rate of 121 per 100,000 distributed largely among nephritis, related forms of heart disease, diabetes, cancer, and pneumonia (figure 2).

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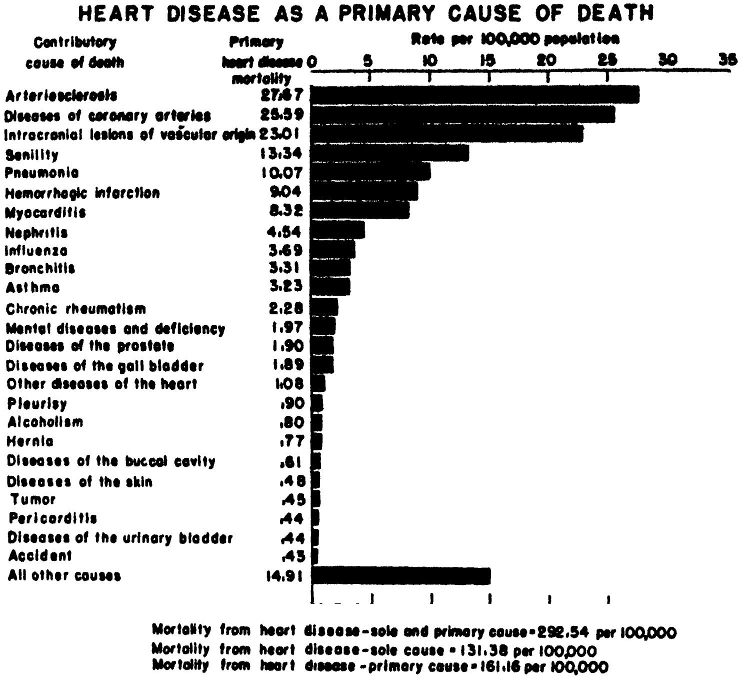
[1] For a discussion of changes in methods of selecting the primary cause of death over a period of years see an earlier paper in this series (*2*) dealing with some of the factors which must be considered in studying trends of mortality from heart disease.

[2] Deaths certified as due to two forms of heart disease (primary and contributory cause) are considered to be deaths due to heart disease as a sole cause in the following percentages



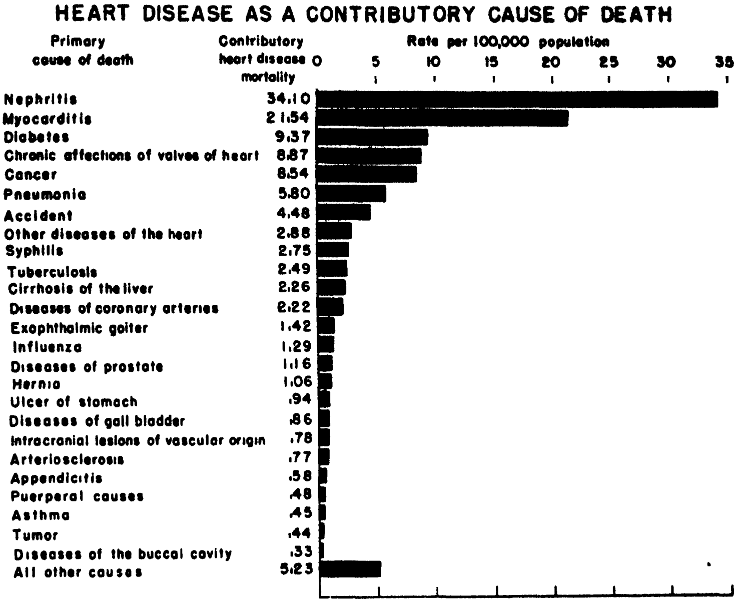
Mortality from heart disease-sole and primary cause = 292.54 per 100,000
Mortality from heart disease-sole cause = 131.38 per 100,000
Mortality from heart disease-primary cause = 161.16 per 100,000

Figure 1. **Mortality from heart disease as a primary cause of death associated with selected contributory causes, 1940.**

Both primary and contributory heart disease mortality, as quoted above, include those deaths for which two or more forms of heart disease were certified, amounting to a rate of 36 per 100,000 in 1940. The corresponding rate in 1925 was 5 per 100,000. The trend in recent years, therefore, has been toward an immense increase in certification of more than one form of heart disease. There is, nevertheless, a marked increase in sole and in primary heart disease mortality irrespective of these deaths, and a slight increase in the contributory heart disease rate, 1925–1940 as shown in the following tabulation:

Heart disease mortality	*Rate Per 100,000*	
	1925	*1940*
Sole, exclusive of 2 or more forms of heart disease	87. 33	131. 39
Primary, exclusive of 2 or more forms of heart disease	94. 74	125. 51
Contributory, exclusive of 2 or more forms of heart disease	79. 89	85. 45
Two or more forms of heart disease	5. 35	35. 65

Several percentages of interest to be seen in the table are the following: 55 percent of all recorded deaths are certified as due to multiple causes, which are allocated as primary and contributory



Mortality from heart disease - sole and primary cause = 292.54 per 100,000
Mortality from heart disease - contributory cause = 121.09 per 100,000

Figure 2. **Mortality from heart disease as a contributory cause of death associated with selected primary causes, 1940.**

cause; 8 percent of all recorded deaths specify heart disease as the contributory cause; 42 percent of all nephritis deaths specify heart disease as a contributory cause; similarly, 35 percent of diabetes deaths, and so forth; 43 percent of recorded deaths from heart disease specify a contributory cause which is other than a form of heart disease; an additional 12 percent of recorded deaths from heart disease certify two related forms of heart disease.

To summarize, deaths from heart disease are frequently certified as associated with other causes of death which are allocated either as primary or contributory to heart disease. Of the total recorded mortality from heart disease, 293 per 100,000, 55 percent or a rate of 161 per 100,000 represents deaths allocated to primary heart disease with an associated contributory cause. An additional rate of 121 per 100,000 represents deaths from causes to which heart disease was allocated as contributory. Heart disease is most frequently associated with diseases of the arteries as a primary cause and with nephritis as a contributory cause.

Heart disease as primary or contributory cause of death in 1940

Cause of death [1]	Mortality from specified cause (sole and primary)	Primary heart disease mortality	Contributory heart disease mortality	Percent of mortality from specified cause with:	
				Any contributory cause	Heart disease as contributory cause
	Death rate per 100,000			Percent	
All causes	1,076.39	[2] 161.16	[2] 121.09	55.4	[2] 11.2
Infectious and parasitic diseases	90.95	4.30	7.31	42.7	8.0
Tuberculosis (all forms)	45.89	.11	2.49	33.7	5.4
Syphilis (all forms)	14.43	.01	2.75	65.2	19.0
Influenza	15.31	3.69	1.29	37.8	8.5
Cancer and other tumors	125.24	.51	8.98	58.6	7.2
Cancer and other malignant tumors	120.25	.06	8.54	58.3	7.1
Nonmalignant tumors	4.99	.45	.44	65.7	8.8
Rheumatism, diseases of nutrition, etc	36.13	3.94	11.48	78.8	31.8
Chronic rheumatism, other rheumatic diseases	1.36	2.28	.09	72.9	7.0
Diabetes mellitus	26.59	0.0	9.37	84.7	35.2
Exophthalmic goiter	2.78	0.0	1.42	80.8	51.0
Pellagra	1.61	0.0	.23	57.8	14.4
Diseases of the blood and blood-forming organs	7.37	1.64	.36	41.2	4.9
Leukemias and aleukemias	3.91	0.0	.28	42.5	7.3
Chronic poisoning and intoxication	2.07	.82	.21	38.7	10.1
Alcoholism	1.92	.80	.19	36.9	10.1
Diseases of the nervous system	103.55	26.66	1.46	66.6	1.4
Diseases of spinal cord	2.09	.01	.29	71.2	13.9
Intracranial lesions of vascular origin	90.95	23.01	.78	68.6	.9
Mental diseases and deficiency	1.03	1.97	.03	25.5	2.9
Epilepsy	1.73	.33	.10	33.2	5.6
Diseases of the circulatory system	314.39	66.62	36.73	55.6	11.7
Diseases of the heart (all forms)	292.54	35.65	35.65	55.1	12.2
Pericarditis	.46	.44	.01	54.6	3.0
Acute endocarditis	2.15	.21	.12	52.1	5.4
Chronic affections of valves and endocardium	33.87	.01	8.87	65.1	26.2
Diseases of myocardium	152.90	8.32	21.54	58.0	14.1
Diseases of coronary arteries, angina pectoris	77.06	25.59	2.22	45.6	2.9
Other diseases of heart	26.10	1.08	2.88	53.4	11.0
Arteriosclerosis and high blood pressure	18.30	27.67	.77	60.8	4.2
Diseases of the respiratory system	66.13	27.87	6.79	57.2	10.8
Bronchitis	3.01	3.31	.21	72.4	7.2
Pneumonia (all forms)	51.98	10.07	5.80	55.5	10.5
Pleurisy	1.55	.90	.15	85.1	9.7
Hemorrhagic infarction	2.31	9.04	.05	67.2	2.1
Asthma	1.70	3.23	.45	49.5	26.8
Diseases of the digestive system	59.25	5.74	6.61	72.1	11.1
Diseases of buccal cavity and adnexa	2.61	.61	.33	74.9	12.6
Ulcer of stomach and duodenum	6.80	.10	.94	85.1	13.8
Appendicitis	9.87	.00	.58	93.2	5.9
Hernia and intestinal obstruction	9.02	.77	1.06	70.4	11.8
Cirrhosis of liver	8.57	.06	2.26	70.9	26.3
Biliary calculi and other diseases of gall bladder	5.99	1.89	.86	80.6	14.4
Diseases of the genito-urinary system	95.37	8.24	35.85	72.4	37.6
Nephritis (all forms)	81.53	4.54	34.10	69.5	41.8
Calculi of urinary passages and diseases of urinary bladder	2.00	.44	.29	93.2	14.6
Diseases of prostate	6.66	1.90	1.16	92.9	17.4
Diseases of pregnancy, childbirth, puerperium	6.74	.13	.48	49.0	7.1
Diseases of skin and cellular tissue	1.13	.48	.02	62.8	2.1
Diseases of the bones	.90	.38	.02	68.5	2.4
Congenital malformations	9.98	.02	.23	44.3	2.3
Diseases peculiar to the first year of life	30.18	.03	.01	33.1	0.0
Senility	7.69	13.34	.01	2.1	.1
Violent or accidental deaths	94.27	.43	4.48	37.5	4.8
Ill-defined and unknown causes	16.02	----------	.07	1.4	.0

[1] Numbers of deaths are from Vital Statistics of the United States (1940), Joint-Cause-of-Death table. The causes shown are numerically important causes of death or causes for which heart disease was recorded as a contributory cause associated with at least 5 percent of deaths from that cause.

[2] A disease of the heart was certified, in 1940, as both primary and contributory cause of death in 46,935 deaths, or 35.65 deaths per 100,000 population and 12.2 percent of deaths from heart disease (sole and primary). If these deaths are considered to be due to a sole cause, heart disease, the primary heart disease rate becomes 125.51 per 100,000, the contributory rate 85.45 per 100,000, and the percentage of all deaths having heart disease as a contributory cause 7.9 percent.

Cross-tabulations of primary and contributory causes of death specific for geographic section and population-size would afford additional comparisons.

STATISTICAL STUDIES OF HEART DISEASE SERIES

(*1*) Moriyama, I. M., and Gover, Mary: I. Heart disease and allied causes of death in relation to age changes in the population. Pub. Health Rep. **63**: 537–545 (1948) Reprint 2854.

(*2*) Woolsey, T. D., and Moriyama, I. M.: II. Important factors in heart disease mortality trends. Pub. Health Rep. **63**: 1247–1273 (1948) Reprint 2889.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 8, 1949

Summary

The total of 11,341 cases of measles reported currently, as compared with 7,161 last week and a 5-year median of 2,995, is more than reported for a corresponding week of the past 5 years. Increased incidence was reported in all of the 9 geographic areas. An aggregate of 9,173 cases was reported in the New England, Middle Atlantic, South Atlantic, West South Central, and Pacific areas. The 7 States reporting more than 400 cases, aggregating 6,441, cases are as follows (last week's figures in parentheses): Massachusetts 1,734 (1,102), New York 946 (512), Pennsylvania 473 (290), Maryland 513 (406), Virginia 419 (253), Texas 1,769 (1,072), California 587 (205). Since September 3, 1948 (approximate average date of seasonal low incidence), 63,510 cases have been reported, a larger number than reported for any corresponding period since that of 1943–44 (73,098). The 5-year median for the period is 28,893.

Of the 4,136 cases of influenza reported for the current week (last week 2,821, 5-year median 10,335), Texas reported 2,300 (last week 1,315), South Carolina 505 (last week 413), and Virginia 347 (last week 253). No other State reported more than 175 cases. The total reported since July 31, average seasonal low date, is 40,406 cases, as compared with 53,893 for the same period last year, which latter figure was also the 5-year median for the period.

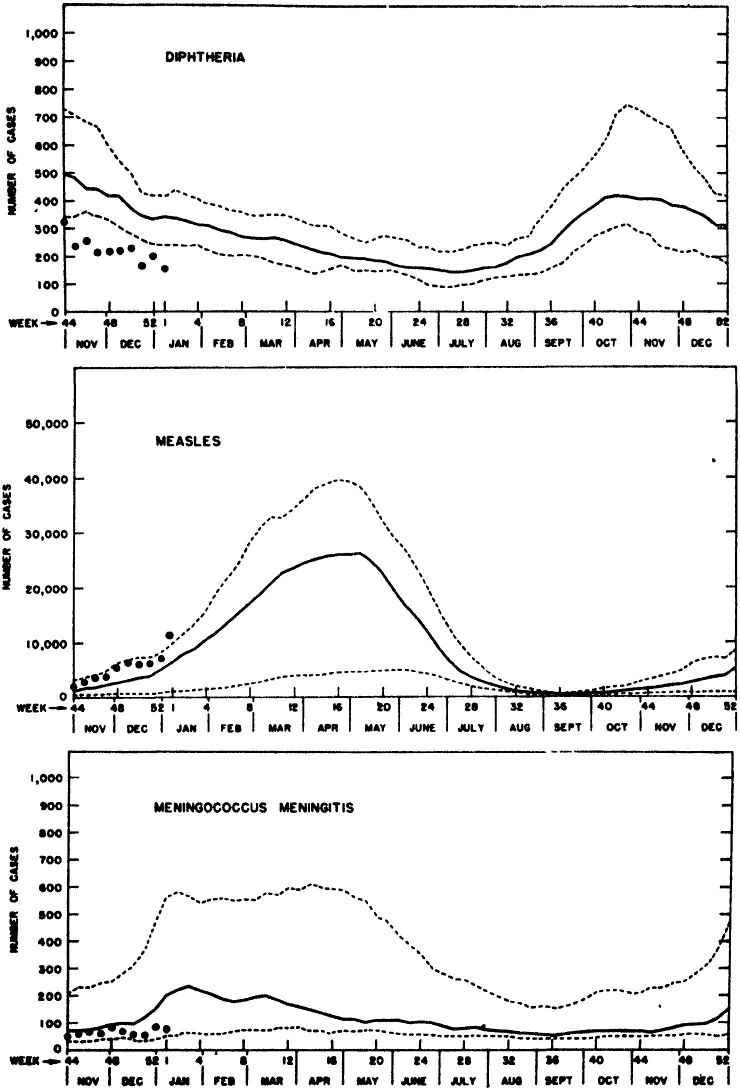
Of the total of 143 cases of poliomyelitis reported (last week 164, 5-year median 52), 57 occurred in California, 15 in Texas, 10 each in South Dakota and Kansas, and 6 each in Wisconsin and Washington.

One case of smallpox was reported, in Wisconsin. One suspected case of epidemic typhus fever reported in Tampa, Florida, is under investigation.

Deaths recorded during the week in 92 large cities in the United States totaled 10,619, as compared with 10,511 last week, 11,221 and 10,531, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year median of 11,223. The total of infant deaths was 694, as compared with 657 last week and 809 for the 3-year median.

Communicable Disease Charts

All reporting States, November 1948 through January 8, 1949



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is a median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

Telegraphic case reports from State health officers for week ended January 8, 1949

(Leaders indicate that no cases were reported)

• Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever[d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1			346		17			46				8	
New Hampshire			1	57		2			10				14	
Vermont				394		3			27				30	
Massachusetts	8	2		1 734		24			182				75	
Rhode Island				84		6			11				1	
Connecticut		3	3	190	2	57			52				8	
MIDDLE ATLANTIC														
New York	9		[b] 8	946	6	310	2		• 181			1	156	12
New Jersey			4	241	4	112	5		96				80	2
Pennsylvania	5		(b)	473	8		1		147		2	4	55	1
EAST NORTH CENTRAL														
Ohio	1			27	1	31			165				25	16
Indiana	3		42	18	1	23	3		55		1	1	14	
Illinois	6		3	45	3	148	1		157		3	2	43	7
Michigan •	1		1	354		18	2		115				12	
Wisconsin	3		33	335	4	6	6		58	1			23	
WEST NORTH CENTRAL														
Minnesota	2			[illegible]	1	4	3		63				5	
Iowa	3	1		17	3	3	11		35			( )	2	2
Missouri	5	1	7	176	3	24	1		38		3		2	
North Dakota				14					17				1	
South Dakota	1					1	10		2					
Nebraska				6			2		6				3	
Kansas	1		4	76	1	27	10		38				4	
SOUTH ATLANTIC														
Delaware				4					6					
Maryland •	1			513	2	37	1		• 17		1		9	
District of Columbia	2			36	1	8			8		1		3	
Virginia	[illegible]		347	419	3	82	1		12		2	1	30	3
West Virginia	1		68	168	2	17			15			1	24	
North Carolina	11			152	1		4		25		2		19	
South Carolina	1		505	18	3	153	4		17		8	1	25	2
Georgia	12		12	84		17			13		6	2	2	7
Florida	3		2	21		26	2		3			5	14	1

EAST SOUTH CENTRAL														
Kentucky	5	--------	2	83	--------	38	2	--------	65	--------	--------	--------	18	11
Tennessee	1	1	48	92	4	48	2	--------	49	--------	4	--------	6	--------
Alabama	8	--------	153	363	--------	64	--------	--------	12	--------	1	1	4	7
Mississippi [a]	8	1	14	34	1	31	--------	--------	5	--------	--------	2	8	--------
WEST SOUTH CENTRAL														
Arkansas	1	--------	175	158	--------	81	--------	--------	10	--------	--------	1	14	3
Louisiana	2	1	9	9	1	28	1	--------	7	--------	1	1	--------	1
Oklahoma	3	--------	91	27	--------	44	--------	--------	17	--------	--------	2	3	2
Texas	14	--------	2,300	1,769	6	298	15	--------	30	--------	1	5	98	31
MOUNTAIN														
Montana	--------	--------	1	13	--------	--------	--------	--------	22	--------	--------	1	--------	--------
Idaho	--------	--------	5	67	1	7	--------	--------	[c] 13	--------	--------	--------	--------	--------
Wyoming	--------	--------	--------	10	--------	1	--------	--------	9	--------	--------	--------	1	--------
Colorado	2	--------	36	112	3	32	1	--------	21	--------	--------	--------	24	--------
New Mexico	2	--------	2	114	--------	14	--------	--------	12	--------	--------	--------	--------	--------
Arizona	13	--------	149	56	--------	28	--------	--------	2	--------	1	1	5	1
Utah [a]	1	--------	34	148	--------	2	--------	--------	4	--------	--------	--------	8	--------
Nevada	--------	--------	--------	1	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
PACIFIC														
Washington	2	--------	3	363	1	4	6	--------	40	--------	--------	--------	7	--------
Oregon	2	--------	32	380	1	35	--------	--------	13	--------	--------	--------	19	--------
California	7	--------	22	587	6	23	57	--------	71	--------	--------	4	50	5
Total	158	10	4,136	11,341	73	1,934	143	--------	2,019	1	37	36	922	--------
Median, 1944–48	361	5	10,335	2,995	191	--------	52	--------	2,383	4	39	40	1,746	--------
Seasonal low week ends	(27th) July 10	--------	(30th) July 31	(35th) Sept 4	(37th) Sept. 18	--------	(11th) Mar. 20	--------	(32d) Aug. 14	(35th) Sept. 4	--------	(11th) Mar. 20	(39th) Oct. 2	--------
Since seasonal low week	5,272	--------	40,406	63,734	917	--------	[1] 27,470	--------	24,717	16	--------	[1] 3,152	10,955	--------
Median, 1943–48	7,932	--------	53,893	28,893	1,695	--------	13,394	--------	40,954	80	--------	4,291	27,391	--------

---

[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever, currently reported separately, as follows: New York 1; Georgia 1; Florida 3; California 1; salmonella infections reported separately, not included, New York 2.

[1] Delayed reports: Iowa (included in cumulative figures only) poliomyelitis 19, typhoid fever 3.

Rabies in man, delayed report: Arkansas, 1 case.

Alaska: Influenza 3; measles 2; scarlet fever 2; streptococcic throat 2.

Territory of Hawaii: Lobar pneumonia 1; murine typhus 2; whooping cough 3; measles 510.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 18, 1948.—During the week ended December 18, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		113	2	354	636	103	170	107	472	1,957
Diphtheria				27	17			1		45
Dysentery, bacillary				6		3				9
German measles				23	12		10	4	5	54
Influenza		14			8	4	1			27
Measles		109	1	261	143	57	23	114	69	777
Meningitis, meningococcal					2		1			3
Mumps		6		111	270	46	21	8	34	496
Poliomyelitis				1		1			1	3
Scarlet fever		3	2	208	60	7	8		9	297
Tuberculosis (all forms)		1	9	88	28	184	6			316
Typhoid and paratyphoid fever				9	1					10
Undulant fever				2	1					3
Venereal diseases:										
Gonorrhea		11	14	68	59	44	10	29	80	315
Syphilis		7	15	78	46	14	10	2	16	188
Whooping cough		27		131	15	1	10	19	1	204

POLIOMYELITIS

Australia.—During the year 1948 poliomyelitis was reported in Australia as follows: First quarter, 13 weeks ending April 3, 150 cases; second quarter, 13 weeks ending July 3, 153 cases; third quarter, 13 weeks ending October 2, 160 cases.

New Zealand.—Poliomyelitis was reported in New Zealand during the year 1948 as follows: First quarter, 13 weeks ending March 29, 209 cases with 10 deaths; second quarter, 13 weeks ending June 28, 334 cases with 14 deaths; third quarter, 13 weeks ending September 27, 342 cases with 12 deaths.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-October 1948	November 1948	December 1948—week ended—			
			4	11	18	25
AFRICA						
Egypt	1					
Cairo	1					
ASIA						
Burma [1]	45	1				
Akyab [1]	5					
Bassein	1					
Moulmein	1					
Rangoon	2					
China:						
Hupeh Province	3					
Wuchang	3					
Kiangsi Province	[2] 9					
Kiangsu Province	2					
Shanghai	1					
India	159,857	7,160	[3] 1,481	[3] 645		
Ahmadabad	77					
Allahabad [1]	3	3				
Alleppey	1					
Bombay [1]	44		3	1	1	
Calcutta [1]	7,497	262	62	44	47	35
Cawnpore	157					
Cocanada	15					
Colachel	12					
Cuddalore	36					
Jodhpur [1]	56					
Kilakarai	21					
Lucknow	48					
Madras	1,059	71	8	17	8	6
Masulipatam	32	1				
Nagpur	71					
Negapatam	16	1				
New Delhi	26					
Raj Samand	6					
Tuticorin	16					
Vizagapatam	1					
India (French):						
Chandernagor	21					
Karikal	300					
Pondicherry	420					
Yanaon	2					
India (Portuguese)	29					
Indochina (French):						
Annam	[4] 41	4	[5] 4			
Cambodia	1,349	5			1	
Cochinchina	592	3				
Bien Hoa	1					
Chaudoc	2					
Cholon	29					
Giadinh	23					
Longxuyen	7					
Mytho	56					
Rachgia	133					
Saigon	136					
Laos	[6] 32					
Tonkin	20					
Pakistan	27,390	[7] 2,721				
Chittagong	35	6			3	2
Karachi	4					
Lahore	401	5	4	2	3	
Siam	43		1			
Syria	3					

[1] Includes imported c

[2] Suspected.

[3] Preliminary figures.

[4] Includes suspected cases.

[5] Deaths.

[6] Includes 12 deaths reported as cases in February 1948.

[7] For 2 weeks, October 31–November 13, 1948.

PLAGUE

(Cases)

Place	January-October 1948	November 1948	December 1948—week ended—			
			4	11	18	25
AFRICA						
Belgian Congo	18	2				
Costermansville Province	11					
Stanleyville Province	7	2				
British East Africa:						
Kenya	37					
Tanganyika	307	5				
Ethiopia	*9					
Madagascar	380	15		[1] 4		
Tamatave	1					
Tananarive	32	1				
Rhodesia, Northern	26	8	8			
Union of South Africa	[2] 45	2		1	1	
ASIA						
Burma [3]	820	76	1	31	18	
Mandalay	18					
Rangoon	19					
China:						
Chekiang Province	37	1				
Wenchow	12					
Fukien Province	343					
Foochow	4					
Kiangsi Province	[4] 23	40				
Kwangtung Province	116					
Yunnan Province	146	3				
India	21,480	1,076	[5] 195	[5] 189	[6] 1	[7] 2
Indochina (French):						
Annam	234	15	8	6		
Cambodia	3	1				
Cochinchina	44	1				
Laos	2		1			1
Mountain Area South-Indochina	22	1				
Java	[8] 1,305	172				
Pakistan	11					
Siam	122	4	3	4		
EUROPE						
Portugal: Azores	15					
SOUTH AMERICA						
Argentina	12					
Buenos Aires Province	9					
Brazil	[9] 125					
Alagoas State	22					
Bahia State	[9] 83					
Ceara State	[9] 11					
Pernambuco State	[9] 9					
Ecuador	38	2				
Chimborazo Province	1					
Loja Province	37	2				
Peru	[10] 49					
Cajamarca Department	11					
Libertad Department	1					
Lima Department	[10] 35					
Piura Department	[10] 2					
Venezuela:						
Aragua State	7					
OCEANIA						
Hawaii Territory: Plague-infected rats [11]	5					

---

[1] December 1-10, 1948.

[2] Includes 4 cases of pneumonic plague.

[3] Includes imported cases.

[4] Includes suspected cases.

[5] Preliminary figures.

[6] In Calcutta.

[7] In Bombay.

[8] Including 1 case of pneumonic plague in Surabaya.

[9] Includes 65 cases not previously reported, distributed as follows: Bahia State—June 1-30, 1948, Feira 4 cases, Seabra 2 cases; July 1-31, Feira 15 cases, Ipira 15 cases, St. Estevam 9 cases, Seabra 6 cases, Sao Goncalo 5 cases; Ceara State—July 1-31, Jardim 6 cases; Pernambuco State—July 1-31, Serrita 3 cases.

[10] Includes 14 cases not previously reported, distributed as follows: Lima Department—September 1-30, 1948, Huaura Valley, Chancay Province, 12 cases; Piura Department—September 1-30, Nangali, Huancabamba Province, 2 cases.

[11] Plague infection was also reported in Hawaii Territory, under date of February 27, 1948, in a mass inoculation of tissue from 19 rats.

*In Shoa Province, July 12-19, 1948.

SMALLPOX

(Cases—P=present)

Place	January-October 1948	November 1948	December 1948—week ended—			
			4	11	18	25
AFRICA						
Algeria	332	21				
Angola [1]	401					
Basutoland	3					
Belgian Congo [1]	2,492	203	90			
British East Africa:						
Kenya	119	22	3	2		
Nyasaland	4,294	459	70	25		
Tanganyika [1]	1,092	65				
Uganda	208	3	1			
Cameroon (French) [1]	4					
Dahomey	445	29				
Egypt [2]	452	6		[3] 3		
Eritrea	9					
Ethiopia	25					
French Equatorial Africa	16					
French Guinea	132	4				
French West Africa: Haute-Volta	438					
Gambia	27					
Gold Coast	1,515					
Ivory Coast	729	39		[4] 5		[5] 12
Libya	261				2	
Mauritania	2					
Mauritius	[6] 1					
Morocco (French)	36					
Mozambique	323	23				
Nigeria	4,085					
Niger Territory	369	30				
Rhodesia:						
Northern	662	681	672			
Southern	1,651	59				
Senegal	8					
Sierra Leone	196					
Sudan (Anglo-Egyptian) [1]	1,451	1		2	3	
Sudan (French)	17					
Swaziland	5					
Togo (British)	24					
Togo (French)	116					
Tunisia	536	6				
Union of South Africa	202	80	P	P	P	
ASIA						
Arabia	8					
British North Borneo	1					
Burma [2]	2,857	29	17	20	39	
Ceylon [2]	22					
China [2]	3,810	59				[7] 127
India	58,843	638	[8] 109	[8] 119		
India (French)	6					
India (Portuguese)	173	8				
Indochina (French)	3,936	45	22	50	12	32
Iran	695	[9] 24				
Iraq [2]	1,031	304	114	132	92	38
Japan	31	2				
Java [2]	2					
Lebanon [2]	67				[10] 2	
Macao Island: Macao	11					
Malay States (Federated) [2]	529	12		4	1	
Manchuria	78					
Pakistan [2]	11,961	[8] 39				
Palestine	8					
Philippine Islands: Mindoro Island		91				
Siam [2]	533	3	1	1		
Straits Settlements: Singapore	13					
Sumatra [2]	1,698					
Syria	534	330	149	42	76	
Transjordan [2]	14	2	11	2	11	
Turkey: Izmir (See also Turkey in Europe)	4					
EUROPE						
France	3					
Germany	3					
Greece	4					
Italy [2]	9					
Portugal	77					
Spain	19					
Canary Islands	9					
Turkey	20	18				3

See footnotes at end of table.

SMALLPOX—Continued

Place	January-October 1948	November 1948	December 1948—week ended—			
			4	11	18	25
NORTH AMERICA						
British Honduras	2					
Guatemala	2					
Mexico	956	18				
SOUTH AMERICA						
Argentina	34	6	1			
Bolivia	31					
Brazil	249	[11] 2	[11] 1			
Chile	8					
Colombia	5,756	236				
Ecuador [1]	3,228	176				
Paraguay [1]	101	4				
Peru [1]	2,247					
Trinidad	[12] 12					
Venezuela [1]	4,341	20			[13] 37	

[1] Includes alastrim.
[2] Includes imported cases.
[3] 2 in Alexandria, 1 in Port Tewfik.
[4] December 1-10, 1948.
[5] December 11-20, 1948.
[6] In Port Louis, imported.
[7] In Amoy, December 1-20, 1948.
[8] Preliminary figures.
[9] October 30-November 6, 1948.
[10] In Beirut.
[11] In Porto Alegre.
[12] Alastrim.
[13] December 5-18, 1948.

TYPHUS FEVER*

(Cases)

(P = Present)

AFRICA						
Algeria	189	6				
Basutoland	9					
Belgian Congo [1]	224	9	6			
British East Africa:						
Kenya [1]	71					
Zanzibar	1					
Egypt	360	5				[3] 2
Eritrea	45	3				
Ethiopia	# 138					
French Equatorial Africa	1					
Gambia: Bathurst		1				
Gold Coast [1]	9		1			
Libya	491	4	1	1		
Madagascar: Tananarive	[3] 7					
Morocco (French)	79	3				
Morocco (International Zone)	5					
Morocco (Spanish) [1]	8					
Mozambique [1]	3					
Nigeria [1]	7					
Rhodesia (Southern)	[3] 1					
Senegal	[3] 4					
Sierra Leone	[3] 9					
Somalia	2					
Tunisia [1]	631	1				
Union of South Africa [1]	395	20	P	P	P	
ASIA						
Burma	5					
China [1]	191	5				
India	[4] 1					[5] 1
India (Portuguese)	7					
Indochina (French) [1]	70	2				
Iran [1]	137					
Iraq [1]	204	6	3	4	2	
Japan	461	12	5	12	10	
Java	3					
Malay States (Federated)			14			
Manchuria	38					
Pakistan	22					
Palestine [1]	[5] 12					
Philippine Islands [1]	[6] 5					
Straits Settlements: Singapore [1]	[7] 20	4				
Syria [1]	59					
Transjordan	60	7	3			
Turkey (see Turkey in Europe).						

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-October 1948	November 1948	December 1948—week ended—			
			4	11	18	25
EUROPE						
Albania	15					
Bulgaria	744					
Czechoslovakia	8					
France	5					
Germany						
British Zone	8					
French Zone	12					
United States Zone	2	6				
Great Britain						
Cyprus [3]	1					
England and Wales	[3] [8] 2					
London	[3] [8] 1					
Ireland (Northern)	[3] 2					
Malta [3]	22	5				
Greece [1] [6]	224	108	1	7	6	
Hungary	56	3				
Italy [1]	566					
Sicily	22	2				
Netherlands	[3] 1					
Poland	286	32				
Portugal	4					
Azores Ponta Delgada	[9] 1					
Madeira Islands Funchal	1					
Rumania [1]	21 818	160	36			
Spain	21					
Turkey	331	31	6	7	10	6
Yugoslavia	592	10	3			
NORTH AMERICA						
Costa Rica [3]	21	3				
Cuba [3]	24					
Guatemala	181					
Jamaica [3]	18	1	1			
Mexico [1]	1 120	3				
Panama Canal Zone	8					
Panama Republic	1					
Puerto Rico [3]	37	1				
SOUTH AMERICA						
Argentina	20					
Bolivia	[10] [11] 93					
Brazil	134	17	8	7		
Chile [1]	384					
Colombia [1]	2 779	238				
Curaçao [3]	16	5				
Ecuador [1]	404	32				
Peru	834					
Venezuela [1]	154	[12] 2			[13] 1	
OCEANIA						
Australia [3]	151	9				
Hawaii Territory [3]	12	1				
Honolulu	2	1				
New Caledonia	1					

---

*Reports from some areas are probably murine type, while others include both murine and louse borne types.

#Includes 63 cases for the period July 19–August 23 1948 not previously reported

[1] Includes murine type

[2] In Alexandria Includes 1 imported case

[3] Murine type

[4] In Calcutta.

[5] In Bombay

[6] Includes suspected cases

[7] Includes nonresident and imported cases

[8] Imported

[9] Death

[10] Includes 9 deaths reported as cases in Cochabamba Department in March 1948

[11] Corrected figure

[12] In Porlamar

[13] In Maracaibo.

YELLOW FEVER

(C—cases D—deaths)

Place		January-October 1948	November 1948	December 1948—week ended— 4	11	18	25
AFRICA							
Gold Coast							
Kumasi	D	1					
Accra	D	2					
Ivory Coast							
Gagnao	D	1					
Sudan (French)							
Sebekoro	D	1					
SOUTH AMERICA							
Argentina							
Cerro Azul, Misiones Territory	D	1					
Bolivia [1]							
Brazil							
Bahia State							
Ilheus City Itajuipe	D	1					
Ubaitaba County	D	1					
Rio Grande do Sul State							
Sao Luiz Gonzaga	D	[2] 1					
British Guiana	D	[3] 1					
Colombia							
Antioquia Department							
Maceo	D	4					
Yolomba	D	1					
Boyaca Department							
Campohermoso	D	1					
Caldas Department							
La Dorado	D	1					
Samana	D	1					
La Victoria	D	1					
Cundinamarca Department							
Medina	D	7					
Intendencia of Meta							
Cumaral	D	1					
Restrepo	D	1					
San Martin	D	1					
Peru [4]							
Loreto Department							
Nauta, Loreto Province	D	1					
Venezuela							
Bolivar State							
Boatanamo Tumeremo County	D	1					

---

[1] Delayed report During the months of April and May 1947 5 cases of yellow fever were reported in Bolivia, distributed as follows Santa Cruz Department Nuflo de Chavez 1 Concepcion 1 Cercado 1 La Paz Department—Province of Sud Yungas Chulmani 1 Province of Nor Yungas Coroico 1

[2] Suspected

[3] In forested area 60 miles up Berbice River from Kwakwani

[4] Delayed report On July 23 1948 1 death from yellow fever was reported to have occurred in Tingo Maria, Huanoco Department Peru in the month of November 1947

DEATHS DURING WEEK ENDED JANUARY 1, 1949

[From the Weekly Mortality Index issued by the National Office of Vital Statistics

	Week ended Jan 1 1949	Corresponding week 1947
Data for 93 large cities of the United States		
Total deaths	10 642	10 418
Median for 3 prior years	10 418	
Total deaths, 53 weeks of year	487 063	488, 486
Deaths under 1 year of age	669	725
Median for 3 prior years	725	
Deaths under 1 year of age 53 weeks of year	35 232	38 620
Data from industrial insurance companies		
Policies in force	70 695 904	66 888 938
Number of death claims	11 770	7 715
Death claims per 1,000 policies in force, annual rate	8 7	6 0
Death claims per 1,000 policies, 53 weeks of year annual rate	9 2	9 1

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 64 FEBRUARY 1, 1949 NUMBER 5

TUBERCULOSIS CONTROL ISSUE NO. 36

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Pneumonectomy Followed by Immediate Thoracoplasty

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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PUBLIC HEALTH SERVICE
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Division of Public Health Methods
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Public Health Reports

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— Editorial —

Nursing in Tuberculosis

The increasing demand for nurses is a constant source of difficulty in tuberculosis control and care In the next few years we expect to see several thousand new hospital beds for the tuberculous, but the question of who will take care of the patients in these beds remains unanswered. In some hospitals today, as much as 70 percent of "nursing" care is given by untrained workers.

We know that all types of hospitals are short of nurses. The reason the shortage is so disproportionate in the field of tuberculosis, we tell ourselves, is that the schools of nursing do not give enough tuberculosis training. In 1946, only 24 percent of the schools of nursing in the United States offered any undergraduate clinical experience in tuberculosis at all. In most schools very little time is devoted to classroom instruction in tuberculosis and what little instruction there is, is usually scattered among lectures on other subjects. Furthermore, it is hard to find teachers and supervisors trained in tuberculosis nursing because so little emphasis has been given it in the past.

For the most part, the schools are not unaware of the inadequacy of their training in tuberculosis. But understandably, they are unwilling to place their students in hospitals where protective techniques are questionable, and the risk of infection is great, as is the case in many tuberculosis wards and hospitals.

True, tuberculosis is communicable, and there is always danger of infection however many precautions are taken. But too many hospitals and sanatoria fail to provide even rudimentary protection in the form of conveniently located handwashing facilities, adequate supplies of gowns and masks, sterilization equipment, and dust-control measures.

This is the thirty-sixth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear the first week of each month The series began with the Mar 1, 1946, issue The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy Subscriptions are obtainable at $1 00 per year, $1 25 foreign

In training, in isolation wards, and on communicable disease services, nurses are taught procedures for isolation in dealing with infectious diseases. But in tuberculosis indeed a communicable disease—teaching and practice are often at variance. In the tuberculosis ward or hospital, the nurse often finds the communicability of the disease treated lightly; and frequently finds doctors disagreeing about protective measures.

There is no doubt that more research in the communicability of tuberculosis and in measures which can be taken to protect all hospital workers against infection is needed. The study of early tuberculous lesions among student nurses now being made under the joint auspices of the Public Health Service and the National Tuberculosis Association is one such program, and we hope that it will bring useful results. The evaluation of BCG as an immunizing agent is another. A study of the effectiveness of gauze masks in protecting rabbits against tuberculous infection was reported by Dr. Lurie and Dr. Abramson in last month's issue of the *American Review of Tuberculosis*.

Some schools of nursing have made energetic and often successful attempts to provide safe surroundings for their girls on tuberculosis service. Quite properly, they do not want to limit their students' experience and their futures by excluding specialties because they are difficult or hazardous. This is encouraging and will result in more nursing care for tuberculous patients.

Lacking any absolute protection against tuberculosis, however, we must make the widest possible application of the communicable disease techniques we already have. Furthermore, we must employ every technique for picking up the earliest manifestations of tuberculous infection among physicians, nurses, and other hospital workers through periodic tuberculin testing and X-ray examination, so that we may define the problem adequately.

As public health officials, members of hospital boards, hospital superintendents, doctors, and nursing educators and administrators, we must arouse ourselves to the necessity for enforcing protective measures. Only after we have made tuberculosis nursing as safe as it can possibly be can we have cause to expect the acute shortage of nurses in tuberculosis to ease; only then can we expect a greater number of nurses to be attracted to the specialty of providing for tuberculous patients the care necessary for complete recovery.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

Tuberculosis Control in the Philippines

Annual Report of the Tuberculosis Control Division, Philippine Public Health Rehabilitation Program, Year Ending June 30, 1948[1]

By LEROY K. YOUNG, *Senior Surgeon* (R)[2] *Public Health Service*

An intensive survey of the war-devastated public-health and quarantine facilities of the Philippines was conducted by the United States Public Health Service during June and July 1945. This survey revealed widespread destruction of all public-health facilities as well as a startlingly high incidence of malaria, tuberculosis, venereal disease, and the dispersal throughout the population of more than 5,000 persons with Hansen's disease, previously segregated in leprosaria. Sanitation was reduced, as a result of enemy occupation and war activities, to a level which constituted a national hazard, especially in the larger cities.

Data collected in this survey were presented to the Congress of the United States, which in December 1945, appropriated $1 million to assist the Commonwealth Government in restoring its public-health facilities and activities. A Philippine Public Health Rehabilitation Program was immediately put into action. Campaigns were started against malaria, tuberculosis, venereal disease, and leprosy. In addition, the rehabilitation of public-health laboratories, all of which had either been destroyed or looted in the war, was begun. The program also called for providing safe water supplies and for restoration of the Philippine Quarantine Service for the prevention of the introduction of cholera, plague, smallpox, and other diseases known to be epidemic in nearby Asiatic ports.

With the passage of the Tydings Act for the general rehabilitation of the Philippines, an additional amount of $5 million was made available to the Public Health Rehabilitation Program, to raise the total of funds for this purpose to $6 million.

The program is being carried out cooperatively by the United States Public Health Service and the Philippine Government. It is directed by Assistant Surgeon General Howard F. Smith of the Public Health Service, but all of the approximately 1,000 employees, with only 3 exceptions, are Filipinos. The program was planned, from the very beginning, in such a way that United States funds could be budgeted on a sliding scale downward over a 4-year period with the expectation that the Philippine Government would provide funds on a corresponding sliding scale upwards. At the end of that period the program is to be transferred completely to the Philippine Government.

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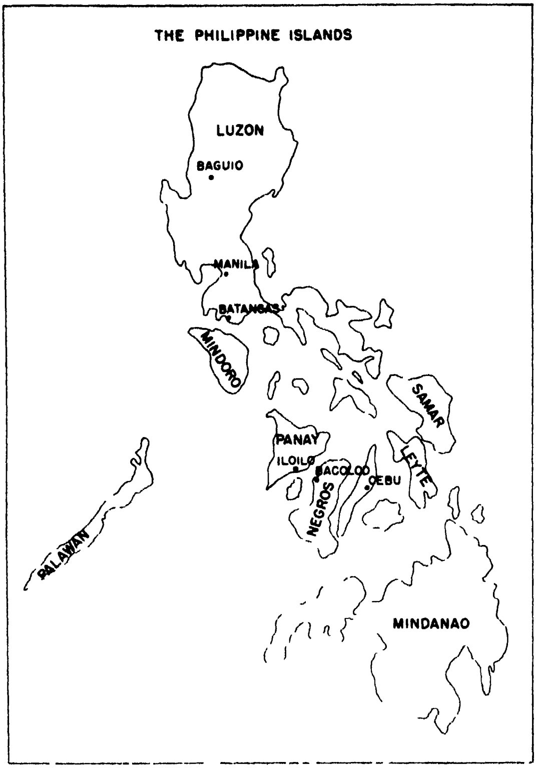
[1] Published by special permission of Howard F Smith, Assistant Surgeon General, United States Public Health Service, Medical Officer in Charge, Philippine Public Health Rehabilitation Program In addition, Dr. Young has added material describing the organization of the Philippine Public Health Rehabilitation Program in 1946 and its first year of operation

[2] Chief, Tuberculosis Control Division, Philippine Public Health Rehabilitation Program.



Tuberculosis Mortality

Pulmonary tuberculosis is the most serious public-health problem in the Philippines. It exists throughout the islands in epidemic form, and it is estimated that 10 percent, or more, of the population suffer from it. The leading cause of death, it is responsible for from 15 to 20 percent of all deaths, and it is one of the leading contributors to the high infant mortality rate. The war not only increased all the predisposing factors, but destroyed most of the islands' means of coping with the disease.

The city of Manila is the only area in the Philippines where vital statistics are reliable. Only about 20 percent of deaths in provincial localities are certified by medical practitioners, while in Manila almost all deaths are reported on certificates signed by attending physicians. These certificates are reviewed by the Manila Health Department and a high percentage are investigated by its inspectors for accuracy of reporting. The health department has a statistical section which compiles and studies the vital statistics of the city.

The data of the Manila health department on tuberculosis mortality are of great importance, for they reveal the extent of the tuberculosis problem in the largest urban community in the Philippines[3] and afford us a yardstick by which to estimate the extent of the problem elsewhere in the islands.

Table 1. *Deaths from tuberculosis (all forms), total deaths from all causes and proportionate mortality from tuberculosis*

City of Manila, January 1-December 31, 1947

Age group (years)	Deaths from tuberculosis (all forms)			Total deaths from all causes			Proportionate mortality from tuberculosis		
	Total	M	F	Total	M	F	Total	M	F
Total	2,359	1,237	1,122	9,873	5,413	4,460	23.9	22.9	25.2
0-4	261	147	114	4,983	2,796	2,187	5.2	5.2	5.2
5-9	54	27	27	288	153	135	18.7	17.6	20.0
10-14	35	19	16	154	90	64	22.7	21.1	25.0
15-19	116	63	53	259	140	119	44.8	45.0	44.5
20-24	227	109	118	427	226	201	53.2	48.2	58.7
25-29	267	125	142	447	227	220	59.8	55.1	64.5
30-34	239	131	108	408	231	177	58.6	56.7	61.0
35-39	280	140	140	488	257	229	57.4	54.1	61.1
40-44	176	99	77	350	209	141	50.3	47.3	54.6
45-49	193	95	98	389	208	181	49.6	45.7	54.1
50-54	132	70	62	274	155	119	48.1	45.2	52.1
55-59	132	63	69	294	155	139	44.8	40.7	49.6
60-64	116	69	47	268	150	118	43.3	46.0	39.8
65-69	63	42	21	188	119	69	33.5	35.2	30.4
70-74	36	21	15	196	102	94	18.4	20.6	16.0
75-79	21	10	11	141	68	73	14.9	14.7	15.1
80+	11	7	4	319	125	194	3.5	5.6	2.1

Unfortunately, however, there is at present no generally accepted figure for the population of Manila and there are no data for age and sex distributions of the population. The last census took place in 1939, and since that time the war has supervened with its profound and unpredictable effects on population movements and on mortality from various causes such as violence, malnutrition, and infectious diseases. Lacking this information, it is impossible to calculate the mortality rate from tuberculosis.

However, there are available data from which the proportionate mortality from tuberculosis may be calculated. This index, expressing the number of deaths from tuberculosis as a percentage of the total number of deaths from all causes (or the number of tuberculosis deaths per 100 total deaths) may be calculated for different ages and for both sexes, and is very useful in the absence of population data. It shows us exactly what part tuberculosis plays in the total mortality at each age and in each sex.

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[3] Population of the registration area (Manila proper) is estimated between 600,000 and 800,000 and of Greater Manila between 800,000 and 1,000,000 Population of the Philippine Islands is estimated at 18,000,000.

The only serious limitation to the usefulness of the proportionate mortality index arises from the fact that it is a ratio and is varied not only by a change in the numerator—number of tuberculosis deaths—but also by a change in the denominator—total deaths from all causes. Thus a significant increase in the number of tuberculosis deaths will be concealed if accompanied by a proportionate rise in mortality from one or more other causes. If the rise in general mortality should be proportionately greater than the increase in tuberculosis deaths, the proportionate mortality index for tuberculosis would actually be a smaller figure

As a concrete example of this limitation, it is to be noted that for all ages and both sexes tuberculosis was responsible for 23.9 percent of all the deaths occurring in Manila in 1947. Broken down, this percentage starts at 5.2 for 0-4 years, rises steadily to 59.8 for the age group 25 29 years, then declines to the other extreme of the age-group distribution, being only 3.5 percent for the group 80 years and over.

The point which it is desired to make is that the proportionate mortality figures conceal entirely the magnitude of infant and child mortality from tuberculosis because of the accompanying high mortality from other causes in the same age group.

The index figure of 5.2 for the 0 4 year age group, compared with that for other ages, appears low until we observe that there were 261 tuberculosis deaths in this age group out of a total of 2,359 for all ages, which is to say that 11.1 percent of all tuberculosis deaths occurred under the age of 5. The reason this high mortality does not reflect itself in the proportionate mortality index is the enormous figure for general mortality in the same age group. Out of a total of 9,873 deaths from all causes, 4,983 or 50.5 percent occurred under the age of 5 years. This distorts the index for tuberculosis deaths.

If this extremely high mortality from nontuberculous causes in this age group could be reduced, other things being equal, the proportionate mortality from tuberculosis would rise to its true magnitude to reflect the seriousness of infant and child mortality from tuberculosis.

The indices for the age groups over 0-4 years need no qualifying remarks. They serve to show clearly the seriousness of tuberculosis as a cause of death in all ages in the Philippines. It is to be noted that, with 4,890 deaths occurring from all causes in persons 5 years of age and older, tuberculosis was responsible for 2,098 or 42.9 percent.

The available figures for tuberculosis mortality in Manila in 1947 are shown in striking perspective when compared with similar figures for the United States for the year 1946, the latest year for which complete data for the United States are available. The figures show that in the United States tuberculosis is responsible for approximately 1 death in 28, but it is the cause of almost 1 in 4 in Manila.

	U. S. 1946	Manila 1947
Number of deaths from all causes (both sexes, all ages)	1,395,617	9,873
Number of deaths from tuberculosis, all forms (both sexes, all ages)	50,911	2,359
Proportionate mortality from tuberculosis, all forms (both sexes, all ages), percent	3.65	23.9

The second group of figures shows the extraordinarily high rate of infant and child mortality in Manila where more than one-half of all deaths occur in children under 5 years of age. In the Unites States the corresponding figure is less than one-tenth.

	U. S. 1946	Manila 1947
Number of deaths from all causes (both sexes, 0–4 years)	130,742	4,983
Percentage of deaths from all causes (both sexes, 0–4 years) to deaths from all causes (both sexes, all ages)	9.4	50.5

Figures show the high rate of tuberculosis mortality in infants and young children in Manila where one-ninth of all the tuberculosis deaths occur in children younger than 5 years of age. In the United States, the corresponding figure is slightly greater than one thirty-ninth.

	U. S. 1946	Manila 1947
Number of deaths from tuberculosis, all forms (both sexes, 0–4 years)	1,300	261
Percentage of deaths from tuberculosis, all forms (both sexes, 0–4 years) to deaths from tuberculosis, all forms (both sexes, all ages)	2.6	11.1

As this is written, preparations are being made for a new census in the Philippines. When the results are reported, it will be possible to calculate age and sex specific mortality rates from tuberculosis to supplement the information gained from the determination of proportionate mortality indices.

Rehabilitation Program

Because of the magnitude of the tuberculosis problem and the limited means available to the Philippine Government for combatting it, the rehabilitation program is aimed primarily at preventing the spread of tuberculosis rather than at treatment of individuals. Sanatorium facilities are few in the Philippines, and it is thought wiser to discover and treat early cases in clinics than to emphasize care for far-advanced cases in sanatoria. Major parts of the plan call for training of doctors and nurses and an intensive health-education program in tuberculosis control methods both for doctors and for the general public.

In the first full year of the program—fiscal 1947—activity was primarily restricted to Manila because, as an established medical center, it could provide training for the medical, nursing, and technical people who were to take part. Also, there was not enough equipment to start the program in other places.

The chief accomplishment of the first year was the construction of a National Chest Center within the grounds of the San Lazaro Hospital to serve as headquarters of the program. The center consisted of two sections: One, composed of three quonset huts, houses the administrative center, the training center, the central laboratories, and dark room. The other, a single quonset, holds the fluoroscopic and pneumothorax sections.

A second accomplishment was the development of a control program for Manila which used the facilities and services of the Philippine Department of Health, the Manila Health Department, the Philippine Tuberculosis Society, the White Cross Preventorium, and the United States Public Health Service.

In fiscal 1947, plans were also made for the establishment of six units, patterned after the Manila center, in six provincial capitals under the auspices of the joint cooperative program.

In fiscal 1948, the Tuberculosis Control Division of the Rehabilitation Program, working in close coordination with the Tuberculosis Control Section of the Philippine Department of Health, the Manila Health Department, the district health officers for the Provinces of Occidental Negros and Batangas, the city health officer of Baguio, the Philippine Tuberculosis Society, and the White Cross Preventorium, continued and expanded the activities of the preceding year.

National Chest Center

The National Chest Center found its clinical and administrative facilities seriously overtaxed soon after its inauguration because of the great number of persons attending the various clinics. Average monthly attendance in 1946–47 was 10,929, and during 1947–48 was 16,754. Other activities also helped to increase the strain upon the center; the activation of a traveling unit for schools and colleges; the opening of the city hall chest clinic; the inauguration of BCG work, and the extension of the program from Manila to several provincial localities. Accordingly, the facilities of the center as originally constructed became inadequate for coping with the volume of clinical and administrative work which has developed and steadily increased since the center was opened.

A plan was devised for erecting a two-story semiconcrete building near the other buildings of the center with space for a 10-unit chest clinic, a BCG clinic, a library and conference room, and offices for the chiefs of sections of the program. The cost of construction, approximately $40,000, was borne by the Department of Health while the equipment was purchased with rehabilitation funds at a cost of approximately $20,000.

This new building was officially inaugurated on May 28, 1948. Also during the year, two 20- by 40-foot quonset hut warehouses were constructed at the National Chest Center for the storage of supplies and equipment.

From July 1, 1947, to June 30, 1948, the clinics of the National Chest Center were in operation 306 days with a total clinic attendance of 201,049 patient-visits.[4] The enlargement of the center permitted improvements and innovations in all three of the broad categories of service—administration, clinical work, and training. There was increased office space for the staff and it was possible to organize an education and publicity section, an immunization and prophylaxis section, and a statistical section.

In the clinic, 10 much-needed examination and treatment rooms were opened. Previously, interviews with new patients were carried out in one large room, with no privacy for adequate physical examinations or treatments. A BCG vaccination clinic was opened, with laboratory facilities for testing and controlling vaccines. An operating room was made available for minor surgical chest operations. The waiting room for the X-ray clinic was enlarged and provided with seats for 50 people. Previously, persons awaiting examination had to stand outside the building, protected in the rainy season only by a tarpaulin.

During the year, the center was used not only for training the program's own personnel, but also for the instruction of physicians and technicians from private clinics, business concerns, and Philippine Government agencies outside the Department of Health. For example, the medical officer in charge of the Batangas Provincial Chest Clinic was given a refresher course. The X-ray technician of the Baguio Municipal Chest Center was sent down from Baguio to undergo training. Two physicians of the Manila Railroad Co. were given a course in X-ray interpretation, as were several United States Army medical officers. At this time several officers and technicians of the Philippine Army are undergoing a course of training. Physicians of the department of pediatrics at the Philippine General Hospital and at the hospital of the University of Santo Tomas were taught the approved methods of inoculating with BCG.

In order to staff the expanded program, a second[5] group of 14 medical officers was chosen for training after careful screening and a competitive written examination. The officers were given a

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[4] For complete figures on operations of this and all clinics in the Philippines see tables 1, 2, 3, and 4.

[5] The first group, consisting of 20 doctors engaged to work in the tuberculosis control program, were trained in fiscal 1947.

6-months' course of instruction in all phases of tuberculosis control and treatment and, since April 1948, have been given regular assignments in the various clinics of the program.

At the end of the fiscal year this division had in its employ 28 medical officers and 1 medical field supervisor. The maximum during the year was 35 medical officers and 1 medical field supervisor. At the end of the year 3 of the first group of medical officers were scheduled to depart for the United States to undertake a 1-year course of advanced training in public-health phases of tuberculosis as United States pensionados. Upon completion of this training they are expected to return to their posts in the program.

BCG Vaccination Project

Under present circumstances in the Philippines, where the number of active and infectious tuberculosis cases is far greater than can be accommodated by available facilities for treatment and isolation, the eventual control of the disease must depend primarily on preventing the development of new cases by increasing the resistance of susceptible persons to infection. Vaccination with BCG is the only widely accepted procedure for achieving this by specific means, and the introduction of BCG vaccination into widespread use in the Philippines has been one of this Division's main objectives from the beginning of the rehabilitation program.

In October 1947, the immunization and prophylaxis section was created. One of its first tasks was to carry out a tuberculin-testing survey to ascertain the percentage of positive and negative reactors in different age groups of the population as a guide to the selection of the most advantageous age groups on which to concentrate our efforts.

It was found, after a survey of 5,448 elementary school pupils, that 48 55 percent of those entering school at the age of 6 were already positive to tuberculin, and that these percentages rapidly rose to 100 percent by the time the 18th year was reached.

Such figures, taken into consideration with the high infant mortality from acute forms of tuberculosis, bespeak massive exposure of infants and young children to tuberculosis, and indicate that a BCG vaccination project must seek to inoculate children as soon after birth as possible. Accordingly, the vaccination project will aim primarily at the inoculation of infants in maternity hospitals, nurseries, well-baby clinics, and other preschool groups, as well as the first few grades of elementary school.

Because of uncertainty about the date when supplies of BCG could be received from the United States, this Division arranged, through the French Minister to the Philippines, for the Pasteur Institute in

Paris to ship BCG by air to the Philippines at regular intervals. Early in January 1948, the first shipment was received of a dried vaccine certified to be viable for 3 months after the date of preparation. This material was carefully tested for nonpathogenicity and viability at the Alabang Serum and Vaccine Laboratories, and specimens were sent to the National Institute of Health of the Public Health Service for similar tests. The findings were that the material was safe, that the organisms were viable, and that tuberculin-negative guinea pigs inoculated with them developed positive tuberculin reactions.

At present, BCG vaccinations are being done on a voluntary basis at the National Chest Center, the nursery and pediatrics clinic of the Philippine General Hospital, the White Cross Preventorium, the Children's and Maternity Hospital, and a few other institutions. The project is still on a small scale in order to enable our physicians to develop a satisfactory technique, to observe and learn to manage the different types of reactions, and to develop public confidence before embarking on a large-scale project.

By the end of June 1948, a total of 1,789 vaccinations had been done. Of these, only 459 returned for post-vaccination follow-up. On the sixtieth day after vaccination, 58.8 percent of those vaccinated and followed up had developed positive tuberculin tests. With improvements in technique, the percentage of tuberculin convertors has, since June 1948, been increased to more than 80 percent.

Education and Publicity Section

In the present state of the antituberculosis movement in the Philippines, a very important role is performed by the dissemination of information concerning modern methods of tuberculosis control to public health workers, practicing physicians, tuberculous patients, and the general public.

During fiscal 1947, activities of this kind were carried out by the headquarters office as part of its functions, the writer personally writing newspaper releases, operating a motion-picture projector, delivering lectures, etc. During the past fiscal year, however, the volume of work became too great, and in November 1947, the education and publicity section was created under the supervision of a physician who has had many years of experience in health education and public relations work.

Since its organization, this section has prepared newspaper releases about our activities, distributed pamphlets and posters obtained from the National Tuberculosis Association in New York, prepared and printed – in several Filipino dialects as well as English material for lay distribution concerning tuberculin testing, BCG vaccination, home care, and related subjects. It has arranged exhibitions of medical motion pictures to medical and nursing students, medical meetings and lay groups, and has prepared and distributed to physicians the first number of a periodical, "Recent Advances in Diseases of the Chest," and arranged for medical officers to address medical and lay groups on subjects relating to tuberculosis.

Other Clinics in Manila

The Manila Health Department in April 1947 created a tuberculosis control section within its organization in order to participate in this Division's tuberculosis control program. Since that time, with the Division's financial and technical support this section has developed steadily into one of the most effective and important units of the program.

Table 2. *Summary of clinic activities, July 1947 June 1948*

Name of clinic	Total number of working days	Total number of clinic visits
National Chest Center, Manila	306	201, 049
Tondo Chest Clinic, Manila	306	27, 784
City Hall Chest Clinic, Manila	152	35, 878
Traveling X-ray Unit, Manila	130	15, 687
Occidental Negros Chest Clinic, Bacolod, Occidental Negros	254	23, 943
Batangas Chest Clinic Batangas	201	6, 680
Baguio Chest Clinic, Baguio	187	7, 623
Cebu Chest Clinic, Cebu (Philippine Tuberculosis Society)	255	18, 999
Iloilo Chest Clinic, Iloilo (Philippine Tuberculosis Society)	255	23, 750
Total	2, 046	361, 393

The tuberculosis control activities of the Manila Health Department in the beginning consisted only in the operation of the home visiting nursing service for the instruction of patients in home care and for the investigation and instruction of the home contacts of tuberculosis cases. All cases and contacts were referred to other clinics for diagnostic study and treatment, while records on all were maintained at the city hall.

It was soon found, however, that under this arrangement the difficulties in the way of rapid interchange of information between clinics made it impossible for the nursing service to operate efficiently. It was decided to establish a chest clinic in the city hall to be operated by the Manila Health Department and to function in close cooperation with the nursing service. The original concept was for this clinic to examine the contacts of reported cases and deaths; to examine the cases themselves as part of public-health supervision if they failed to be followed by their own physicians or clinics; to examine food handlers, barbers, and other applicants for health cards as prerequisite for employment, and to examine school teachers and other city employees. Treatment facilities were to be limited, and therapeutic measures, except for the simplest, were to be provided by larger clinics.

The plan was carried out. The city hall chest clinic opened on January 2, 1948. From the opening through June 1948, it operated 152 days, had 36,000 patient-visits and made 27,000 small film examinations—which discovered 1,584 cases of definite tuberculosis, 2,109 cases of suspected tuberculosis, and 1,008 cases of nontuberculous pathology.

The home visiting nursing service, begun during the fiscal year 1947, has been continued during the present year with a total of 62,396 visits. The follow-up work of the nurses has been made more effective and systematic by the institution of a central case register.

Tondo Chest Clinic, situated in the most congested part of Manila's poorest section, operated 306 days, had 27,784 visits, made 11,861 small film examinations, 1,217 fluoroscopic examinations of new cases, and 543 fluoroscopic examinations of old cases. It discovered 929 cases of definite tuberculosis and 2,046 of suspected tuberculosis.

School and College Surveys

During the past fiscal year, considerable progress was made in conducting chest X-ray surveys of students of colleges and universities in Manila. A survey of 17,818 students from the three largest universities was completed and the results analyzed and charted.

Summarizing the findings briefly, it may be said that 4.5 percent of all the students examined had definite tuberculosis while another 1.4 percent had lesions suspected but not proved to be tuberculous.

Of the cases of definite tuberculosis, 74.2 percent were minimal, 21.8 percent were moderately advanced, while only 4.0 percent were far advanced. Again, for the cases of definite tuberculosis, 55.2 percent were active, 28.2 percent had questionable activity, while 16.6 percent were considered probably inactive.

These figures, derived from a survey of more than one-fifth of Manila's college population and therefore reflecting conditions among the group as a whole, demonstrate the reasons why this activity may be considered one of the most fruitful in our program. It gave a high yield of definite cases in an organized, intelligent, and cooperative group. As a consequence, case-finding is administratively facilitated while follow-up and treatment have almost 100 percent cooperation. The high percentage of minimal and moderately advanced cases

Table 3. Summary of case finding activities, July 1947–June 1948

Name of clinic	Number of small film examinations	Small film diagnoses				Number of fluoroscopic examinations of new cases	Fluoroscopic diagnoses			
		Tuberculosis	Suspected Tuberculosis	Nontuberculous pathology	Negative		Tuberculosis	Suspected tuberculosis	Nontuberculous pathology	Negative
National Chest Center, Manila	55 850	3 552 6.4%	5 994 10.7%	938 1.7%	45 366 81.2%	37 943	5 696 15.0%	0 0	5 716 15.1%	26 531 69.9%
Tondo Chest Clinic, Manila	11 861	710 6.0%	2 046 17.2	1 095 9.2%	8 010 67.5%	1 217	219 18.0%	0 0	339 27.9%	659 54.1%
City Hall Chest Clinic, Manila	27 234	1 584 5.8%	2 109 7.7	1 008 3.7%	22 533 82.7%					
Traveling X-ray Clinic, Manila	14 722	315 2.1	961 6.5	333 2.3%	13 113 89.1%					
Occidental Negros Chest Clinic, Bacolod	15 750	1 240 7.9	1 074 6.8	347 2.2%	13 089 83.1%	770	142 18.4%	0 0	112 14.5%	516 67.1%
Batangas Chest Clinic, Batangas	2 554	289 11.3	364 14.3%	122 4.8%	1 779 69.6%	1 534	85 5.5%	106 6.9%	23 1.5%	1 320 86.1%
Baguio Chest Clinic, Baguio						6 271	218 3.5%	69 1.1%	230 3.7%	5 754 91.7%
Cebu Chest Clinic, Cebu (Philippine Tuberculosis Society)						7 493	718 9.6%	204 2.7%	1 813 24.2%	4 758 63.5%
Iloilo Chest Clinic, Iloilo (Philippine Tuberculosis Society)						11 805	2 023 17.1%	1 968 16.7%	5 731 48.5%	2 083 17.6%
Total	127 971	7 690 6.0%	12 548 9.9	3 843 3.0	103 890 81.1%	67 033	9 101 13.6%	2 347 3.5%	13 964 20.8%	41 621 62.1%

makes treatment less expensive in time and money and insures a majority of permanently arrested lesions. The high percentage of active disease in conjunction with the high percentage of minimal lesions is a compelling call to action.

Timely intervention while the students are in college will, in most cases, enable them to finish their work and begin their careers with health restored. Failure to find them, on the other hand, will mean that most of them will progress to far-advanced disease and break down after graduation and after assuming professional and family obligations that make it difficult or impossible to undertake treatment.

It is, of course, probable that the same percentages of infection exist among young people of the same age not attending college, and therefore the same work should be done among them. In the beginning, however, while facilities and personnel are yet limited, it is more advantageous to work in the schools where the surveys are administratively easier, with a group of young people who are destined to be the nation's future leaders. Eventually, however, these activities should be extended to include all young men and women of the age group 18 30 years.

At present, the majority of cases found in the schools are referred to our regular chest clinics for follow-up and treatment if they do not have private physicians. This is the only possible arrangement, but it is not a satisfactory one, because it is psychologically bad to have these early, asymptomatic cases mingling with the far-advanced and sick patients at the clinics. Adequate and appropriate attention can very rarely be given to the students at these clinics because the management of asymptomatic cases is very different from the main activity of the clinics, which is the care of moderately advanced cases undergoing pneumothorax treatment and other therapeutic measures.

It is still one of this Division's main objectives to see a college chest clinic in operation which will X-ray all new matriculates in Manila colleges, re-X-ray all students at least once every 2 years and provide all follow-up and treatment for those needing them. It is felt that no other antituberculosis activity would return so much benefit for the time and money spent, with the possible exception of BCG vaccination. Such a clinic could serve as a demonstration and model for the eventual spread of similar clinics to other parts of the islands.

During the first surveys, this Division encountered a great deal of difficulty in securing adequate and satisfactory electric power to operate the X-ray apparatus, and in achieving satisfactory dark-room facilities for processing films under field conditions. In January 1948, however, the Division engaged an X-ray engineer and an automotive truck expert to design a compact traveling X-ray unit consisting of a 25 kilovolt-ampere generator and a completely equipped dark-room mounted on a truck which also provided space for loading a trans-

Table 1 *Summary of diagnostic activities (exclusive of case-finding), July 1947 June 1948*

Name of clinic	X Ray		Laboratory examinations									
	Fluoroscopic examinations of old cases	14" x 17" X ray films	Total	Sputum examinations	Blood examinations	Urine examinations	Stool examinations	Pathological specimens	Sedimentation rates	Gastric washings	Specimens cultured	Guinea pig inoculations
National Chest Center Manila	24 158	4 409	21 783	17 693	1 282	1 820	231	350	254	0	127	26
Tondo Chest Clinic Manila	43	1 975	1 016	923	31	54	8	0	0	0	0	0
City Hall Chest Clinic Manila	0	1 420	Specimens sent to National Chest Center laboratory or Manila Health Department laboratory									
Traveling X ray Unit Manila	0	946	Specimens sent to National Chest Center laboratory									
Occidental Negros Chest Clinic Bacolod Occidental Negros	2 0[illegible]4	794	941	943	0	0	0	0	0	0	0	0
Batangas Chest Clinic Batangas	161	505	452	452	0	0	0	0	0	0	0	0
Baguio Chest Clinic Baguio	133	8	372	310	42	13	7	0	0	0	0	0
Cebu Chest Clinic Cebu (Philippine Tuberculosis Society)	2 773	217	0	0	0	0	0	0	0	0	0	0
Iloilo Chest Clinic Iloilo (Philippine Tuberculosis Society)	10 [illegible]71	0	5	2	0	2	1	0	0	0	0	0
Total	4[illegible] 4[illegible]8	10 274	24 568	20 320	1 355	1 889	247	350	254	0	127	26

portable 70-millimeter X-ray unit. Because of the greater size of truck required and the poor condition of the streets and roads of the Philippines, it was decided not to build a unit in which the complete X-ray apparatus is permenently mounted, although such a unit would be more desirable because of the convenience of not having to dismantle and assemble the X-ray apparatus at each site of examination. With well-trained personnel, however, the dismantling and assembling of our units take less than 1 hour.

In June 1948, this traveling X-ray unit was delivered. Preliminary testing and small surveys under field conditions have shown that it is very efficient and entirely satisfactory. During the coming year many surveys will be completed with it.

Provincial Clinics

Early in the past fiscal year, when plans for establishing chest clinics in the provinces with rehabilitation funds were being considered, it was decided that because of the comparatively short life-span of the rehabilitation program such clinics would have little chance of becoming permanent unless the local communities and governments were actively interested in maintaining them after cessation of aid from the United States. Accordingly, the policy was established that provincial governments should take such a large part in establishment and maintenance that the clinics would be self-sufficient by the time the rehabilitation program ended.

The Occidental Negros chest clinic in Bacolod City was opened on September 1, 1947, as the first of such provincial chest clinics established. It was completely equipped with a 70-millimeter photo Roentgen unit, with a 60-milliampere fluoroscopic-radiographic unit, with dark-room and clinical laboratory facilities and with office equipment. The Division assigned one medical officer and one X-ray technician to this clinic while the tuberculosis control section of the Department of Health assigned another medical officer and one laboratory technician. The Provincial government supplied a number of clerks, nurses, guards, and janitors. Opened September 1, 1947, this clinic was in operation for 254 days and had 23,943 visits. It made 15,750 small-film examinations, 770 fluoroscopic examinations of new cases and 2,054 of old cases. It discovered 1,382 cases of definite tuberculosis and 1,074 cases of suspected tuberculosis.

At the end of the fiscal year the Provincial government had received $20,000 from the Department of Health, to cover the cost of a new chest clinic building, construction of which is expected to start during the coming year. It is planned to increase the scope of activities centering around this clinic as part of a general public-health

Table 5 *Summary of treatment activities July 1947 June 1948*

Name of clinic	Pneumothorax					Other operations			
	Total number of pneumothorax treatments	Number of patients receiving treatment	Number of initial treatments	Number of refill treatments	Thoracentesis	Phrenic operations	Thoracoscopy	Pneumonolysis	Thoracoplasty stages
National Chest Center Manila	11 673	3 442	158	11 515	245	10	0	0	4
Tondo Chest Clinic Manila	565	184	31	534	13	0	0	0	0
City Hall Chest Clinic Manila			Patients	referred	to other clinic	for treatment			
Traveling X ray Unit Manila			Patient	referred	to other clinic	for treatment			
Occidental Negros Chest Clinic Bacolod Occidental Negros	2 772	1 435	60	2 712	102	0	0	0	0
Batangas Chest Clinic Batangas	186	40	21	165	0	0	0	0	0
Baguio Chest Clinic Baguio	145	38	6	143	1	0	0	0	0
Cebu Chest Clinic Cebu (Philippine Tuberculosis Society)	243	26	12	231	1	0	0	0	0
Iloilo Chest Clinic Iloilo (Philippine Tuberculosis Society)	806	14	29	779	11	0	0	0	0
Total	16 346	231	317	16 079	373	10	0	0	4

demonstration in which all the other divisions of the public-health rehabilitation program will join.

Working conditions in Bacolod have been fairly good during the past year. There is electricity during the entire day and water is available during most of the morning.

In November 1947, the Batangas provincial chest clinic in the city of Batangas was opened to the public. During the first few months the clinic operated with fluoroscopic apparatus only, since a 70-millimeter photofluorographic unit could not be made available until January 1948.

The Batangas chest clinic occupies a whole building newly renovated by the Provincial government. It is one of the best clinics of the program. Unfortunately, however, shortly after the clinic was inaugurated, an electric-power shortage developed so that electricity is now available only for 1 or 2 hours a day, preventing the clinic from working to full capacity. In addition, water has to be brought to the clinic in barrels because of low pressure in the mains. No effort is being spared to solve these difficulties. If the electrical shortage continues, a generator may have to be sent to this clinic.

The Batangas clinic has been open for 201 days and has had 6,680 visits. It has made 2,554 small-film examinations and 1,534 fluoroscopic examinations of new cases. Of those examined, 374 have proved to have definite tuberculosis and 470 are suspected of having the disease.

The Baguio municipal chest clinic was established under the same general policy governing provincial clinics, except that our agreement was with the city of Baguio rather than with the Provincial government. This clinic was equipped with a fluoroscopic and radiographic unit only, as the size of the population did not justify the purchase of a 70-millimeter photofluorographic unit. It has made 6,271 fluoroscopic examinations of new cases and has found 218 definite and 69 suspected cases.

Up to the last 2 months of the past fiscal year, this Division cooperated with the Philippine Tuberculosis Society in the operation of its chest clinics in the cities of Cebu and Iloilo. These clinics were enabled to resume activities after the war when this Division issued to each of them a fluoroscopic-radiographic unit and other accessory equipment. The Division did not send any of its own personnel and had little jurisdiction over their administration as it was felt that the Philippine Tuberculosis Society was capable of administering them satisfactorily. It was reported that Cebu made 7,493 fluoroscopic examinations of new cases and found 718 cases of definite tuberculosis and 204 suspects. Iloilo made 11,805 examinations of new cases of whom 2,023 were definitely tuberculous and 1,968 suspected.

In May 1948, the relationship with the Philippine Tuberculosis Society was terminated when the Society was able to purchase new equipment and to return the borrowed equipment to this Division. Our liaison with the Philippine Tuberculosis Society for correlation of activities and interchange of information will continue as before.

It is hoped that all these activities may be continued in fiscal 1949, in order that the Tuberculosis Control Program of the Philippines may be firmly established before the termination of United States aid in 1950.

Pneumonectomy Followed by Immediate Thoracoplasty

—Preliminary Report of Three Cases [1]—

By Roland K. Iverson, M. D.[2] and Homer L. Skinner, M. D.[3]

Pulmonary resection is rapidly assuming its proper place in the treatment of pulmonary tuberculosis. The lower morbidity and mortality rates of recently reported series of cases reflect the amazing progress which has been made in this field of surgery. As is often the case with a radically new procedure, however, certain inherent undesirable features have presented themselves which were not at first apparent. The encouraging early results of resection have often given way to extreme pessimism in the face of late spreads of disease in the contralateral lung following pneumonectomy, and in the ipsilateral portions of the remaining lung following lobectomy. Bronchial fistulas and tuberculous or mixed empyemas are not uncommon. Overdistention of the contralateral lung resulting in reduced respiratory efficiency and reactivation of quiescent tuberculous foci have been particularly discouraging in the pneumonectomy cases. Only by increasing experience in selection of cases, improved surgical techniques, and antibiotic therapy, have many of these undesirable features been eliminated. In order to circumvent the complications resulting from overdistention of the remaining lung, it has become routine practice in most thoracic clinics to follow pneumonectomy by one or two stages of thoracoplasty, and upper lobectomy by a single stage thoracoplasty.

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Our interest in pulmonary resection for tuberculosis is relatively recent. In a limited series of cases we have noted the more benign course of post-thoracoplasty resections as compared to those who had had no previous thoracoplasty—this, despite the increased technical difficulties of the procedure itself. We also encountered one patient who refused a post-resection thoracoplasty. Despite this patient's present excellent condition, we definitely feel that his future health is jeopardized by his refusal to submit to thoracoplasty. In only one patient have we encountered bronchial fistula and empyema. This condition occurred 3 weeks after operation in a patient who had left pneumonectomy for severe bronchial stenosis. Despite intensive therapy, the patient died. It is our opinion that the procedure to be described would greatly reduce or prevent occurrence of this distressing complication.

We report the cases of three patients upon whom total pneumonectomy and thoracoplasty were performed as a single operation. Two of these resections were for pulmonary tuberculosis, and one for pulmonary cyst and multiple lung abscesses with emphysema in the contralateral lung. In all of these cases, post-pneumonectomy thoracoplasty would ordinarily have been indicated.

This is intended as a preliminary report only, and is believed to be the first report of this combined procedure.

It seems appropriate to include a few pertinent details of pre-operative management, as well as of technical considerations.

Pre-operative management—Tuberculous patients received streptomycin for 1 to 2 weeks, and penicillin for 24 hours before surgery. Premedication consisted of Nembutal gr. 1½ one and one-half hours before operation, and morphine sulfate gr. ¼ and atropine sulphate gr. 1/150 one hour before surgery.

Position on table and anesthesia—These patients were operated upon in the face-down position with the sound lung uppermost as advocated by Overholt (*1*). The advantages of this position have been enumerated by Overholt and others, but certain features deserve re-emphasis. Two of our three patients had a frozen lung. In the usual lateral position, a great deal of lung manipulation is necessary to expose the hilus in such cases, and there is very real danger of direct spread to the opposite lung. In the face-down position, however, minimal manipulation and dissection is necessary to expose and occlude the bronchus as a preliminary step. As a consequence, cavity-bearing areas, particularly in the apex, need not be mobilized until the bronchus has been occluded, thereby greatly lessening the danger of contralateral spread.

It was also our impression in these and other cases operated upon in the face-down position, that the incidence of shock was lessened as well as the occurrence of cardiac arrhythmias. To further combat the latter, intravenous procaine was used prophylactically.

Cyclopropane, oxygen and ether were the anesthetic agents used. The patient was put in position on the face-down table as soon as the intratracheal tube had been placed and the course of anesthesia was proceeding smoothly. Intratracheal aspirations were carried out frequently.

Operative technique—Exposure for the combined pneumonectomy and thoracoplasty was obtained through a long postero-lateral incision, the proximal limb being carried somewhat higher than in the usual incision for pneumonectomy alone. We have made a practice of incising both skin and muscles close to the spinous processes, a procedure similar to that recommended by Brock (*2*), which permits both raising and closure of the trapezius and rhomboid muscles as a single layer. Blood loss also appears to be minimized since the posterior branches of the intercostals can be visualized and ligated before division.

The pleural cavity was entered through the periosteal bed of the sixth rib, following resection of generous segments of ribs 5 and 6 and the splitting of ribs 4 and 7 paravertebrally. The intervening intercostal nerves and vessels were doubly ligated and divided. Before insertion of the rib spreader, the lung was freed from the chest wall above and below the periosteal incision In two of our cases, pleural symphysis necessitated beginning the dissection in the endothoracic plane. The intrapleural plane was entered as soon as feasible, and adhesions were severed by sharp dissection.

As previously noted, the posterior aspect of the hilus was exposed as quickly as possible. The bronchus was then freed from the surrounding tissues and a right angle clamp placed distally. Several 2-0 intestinal cotton sutures on an atraumatic needle were then placed high on the bronchus. These sutures were tied over the bronchial stump as the bronchus was being cut proximal to the clamp. This method traumatized the bronchus little and reduced to a minimum contamination of the pleural cavity and loss of anesthetic agent. No mattress sutures were used in any case since an attempt was made to amputate the bronchus as high as possible. This type of amputation permitted the stump to retract deeply into the mediastinum and facilitated its covering with mediastinal pleura.

The pulmonary vessels were then treated in the usual manner—the artery being ligated and divided first, then the veins. Reinforcing transfixion ligatures were used proximally, but distally only single ligatures or an Ochsner clamp were used to permit leaving a large cuff.

When the division of the hilar structures was completed, the lung was then freed from its remaining attachments to the chest wall and mediastinum. Insofar as possible, care was taken to avoid breaking into thin-walled cavities, and over these areas dissection was carried out in the endothoracic plane. This precaution particularly applied to large apical cavities. Bleeding from the raw chest wall was easily controlled by warm saline packs. If at all possible, however, we preferred to sever adhesions intrapleurally to minimize blood loss.

The phrenic nerve was routinely interrupted, be it a right or left pneumonectomy.

Upon removal of the lung, the bronchial stump was covered with mediastinal pleura mobilized to whatever degree necessary to permit closure without tension.

At this point the patient's condition was carefully evaluated. If it was considered satisfactory, thoracoplasty was immediately performed. Generous posterior segments of ribs 4, 3, 2, and 7 were resected in that order--ribs 5 and 6 having previously been removed. The transverse processes and posterior rib stumps were not resected. Rib 1 was left intact. In our second case, a 21-year-old male, rib 2 was also left in situ but the intercostal structures were freed from its medial surface and allowed to fall inward It was our intention to preserve the normal chest and shoulder contours insofar as possible and yet permit adequate obliteration of the pleural space.

It should be noted that only about 20 minutes additional operating time was necessary to perform the thoracoplasties. Even after such a formidable procedure as pneumonectomy, the addition of thoracoplasty did not produce shock or even an appreciable fall in blood pressure in any of these patients. It appears that performance of the additional operation at this time is not as shocking a procedure in itself, as when it is performed over a closed and fairly rigid pleural space 4 to 6 weeks after pneumonectomy.

After thoracoplasty, the pleural cavity was thoroughly irrigated with saline and a No. 24 catheter inserted through a stab wound in the eighth intercostal space and posterior or midaxillary line. The catheter was held in position against the posterior chest wall by a fine catgut suture encircling its tip.

The intercostal structures, muscles, subcutaneous tissue, and skin were next approximated with interrupted cotton sutures, and a lightweight but snug dressing applied. One gram of streptomycin and 100,000 units of penicillin were instilled through the catheter and the catheter clamped.

The patient was then immediately placed on his back and the tracheobronchial tree thoroughly aspirated. In none of the following cases was postoperative bronchoscopy necessary. We have abandoned the practice of routine postoperative bronchoscopy for this type of case as well as for others after major thoracic operations. Bronchoscopy is reserved for those patients who continue to be "wet" after intratracheal aspiration, or who demonstrate any evidence of airway obstruction. We feel that it unnecessarily prolongs anesthesia, and is no more effective than properly performed intratracheal aspiration with a catheter.

The anesthetic agent was discontinued during the skin closure and a mixture of helium and oxygen administered. This mixture thoroughly removed the anesthetic agent from the lungs and facilitated the patient's early reaction after operation. The intratracheal tube was replaced by an oropharyngeal airway as soon as the patient started to react. Nasal oxygen was started immediately.

Blood was administered during the operative procedure in amounts up to 1,500 cc. and continued after operation up to 2,000–2,500 cc. A 500 cc. transfusion was usually given on the first postoperative day.

General postoperative considerations—The same general principles applied to these patients as to others who have undergone major thoracic surgery. Only a few points will be emphasized.

Semi Fowler's position and frequent turning were important to permit maximum pulmonary ventilation. Sedation in adequate amounts to control pain was necessary, and the patient was urged to cough and raise sputum at regular intervals. Coughing was greatly increased by having the patient sit up and applying pressure over the operated side. This could usually be started on the evening of the day of operation.

It has been noted that these patients had less dyspnea and coughed more effectively in the early postoperative period than patients who have had pneumonectomy alone. This favorable reaction was attributed to the weight of the scapula and the pressure dressing over the decostalized area which rendered the mediastinum relatively stable.

The pleural catheter was attached to the Stedman suction apparatus 4 hours after operation. Suction of — 10 cm. of water was maintained continuously for approximately 48 hours, except for 4 hours on the first postoperative day following the instillation of 1 gram of streptomycin and 100,000 units of penicillin. These antibiotics were again instilled just before removal of the catheter. No aspirations were necessary in any of the patients following removal of the catheter.

Early ambulation was practiced, and patients were urged to move about as much as possible after removal of the catheter and change of dressing on the second postoperative day. Sutures were removed on the sixth postoperative day. A pressure dressing, however, was maintained for 2 to 3 weeks or until the chest wall had become firm

The following case reports illustrate the unusually benign postoperative course of three patients who have had total pneumonectomy and thoracoplasty performed at a single operation:

Case 1.—[illegible], colored male, 33 years of age. Admitted April 16, 1948, following prolo[illegible] hospitalization at another hospital. Admission chest film revealed

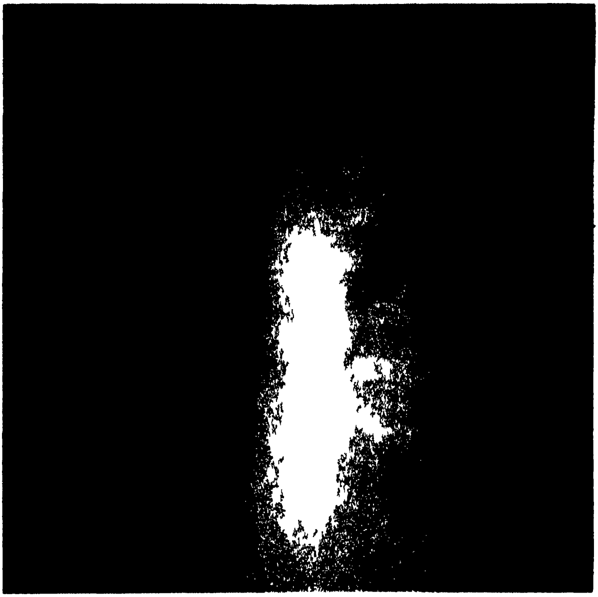

Figure 1 N P —Extensive infiltration and cavitation in left upper and lower lobes

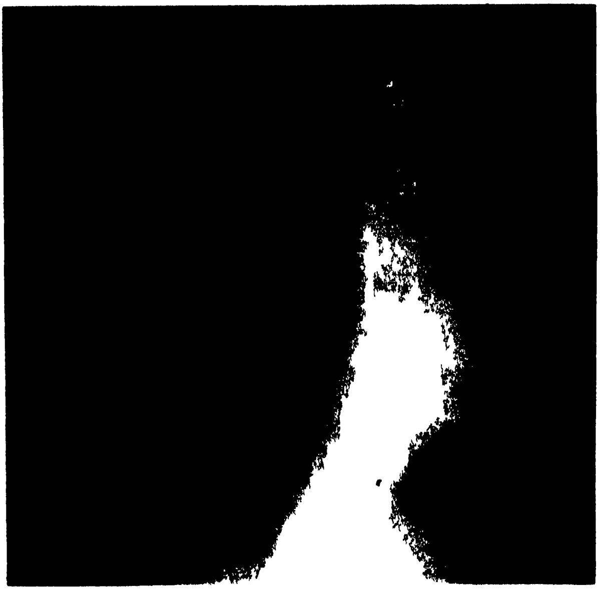

Figure 2 N P — Postoperative combined pneumonectomy and thoracoplasty.

extensive infiltration and multiple large cavities on the left, and infiltration in the right upper lobe. Left pneumonectomy was considered but operation was deferred because tomography revealed a questionable small cavity in the right upper lobe. Repeat tomography 2 months after admission failed to demonstrate cavity in this region, and patient was prepared for surgery. Bronchoscopy revealed no evidence of significant endobronchial tuberculosis.

Streptomycin 1 gm. daily was begun on July 5, 1948, and penicillin 50,000 units every 3 hours was started on July 13, 1948. After the usual preoperative preparation, left pneumonectomy and thoracoplasty were performed on July 14, 1948, in the manner described, generous posterior segments of ribs 2 through 7 being resected.

Convalescence was completely uneventful. Temperature remained normal from the ninth postoperative day, and the highest temperature recorded in the postoperative period was 100.4° F. Bathroom privileges were allowed on the third postoperative day.

The wound healed per primam and excellent collapse of the left upper hemithorax was present. Postoperative films showed no mediastinal shift at any time and there was no evidence of contralateral spread.

The patient, in excellent general condition, was transferred back to the referring facility on September 7, 1948. Cough was minimal and productive of a small amount of mucoid sputum which was repeatedly negative for acid-fast bacilli by smear and concentrate.

Case 2: R. K., white male, age 21. Admitted May 12, 1948, from another facility where he had been hospitalized since May 1947. Admission film revealed extensive infiltration and cavitation on the left, and an essentially clear right lung. Bronchoscopy in January 1948, had shown moderately severe tuberculous involvement of the left stem bronchus. Streptomycin therapy in dosage of 1 gm. daily for 6 weeks produced marked subjective improvement but Roentgen findings persisted.

Tomography revealed cavitation in both the left upper and lower lobes one cavity being present anteriorly in the lingular segment of the upper lobe. Total thoracoplasty was considered but resection seemed preferable. The combined procedure was recommended. It should be noted that this patient observed the postoperative course of case 1 closely, and then also requested the procedure himself.

Streptomycin ⅔ gm. daily started August 19, 1948, and penicillin 50,000 units every 3 hours on August 21, 1948. Left pneumonectomy and thoracoplasty performed September 1, 1948. As noted in the preliminary discussion only ribs 3 through 7 were resected in this patient. The intercoastal structures, however, were freed from the medial aspect of rib 2 and allowed to fall inward

Postoperative management of this patient was exactly as previously described, and convalescence was completely uneventful. Temperature remained normal from the third postoperative day. Patient was up in a wheelchair on the second postoperative day and ambulant on the fourth postoperative day. In regard to walking, it must be mentioned that this patient had had a traumatic mid-thigh amputation of the left leg at the age of 6, and ambulation necessitated his wearing a rather cumbersome prosthesis.

As a result of leaving in rib 2 as well as rib 1, this patient's posture and arm and shoulder function were excellent.

Cough and expectoration were non-existent after operation. Postoperative films showed a clear right lung and at no time any mediastinal displacement

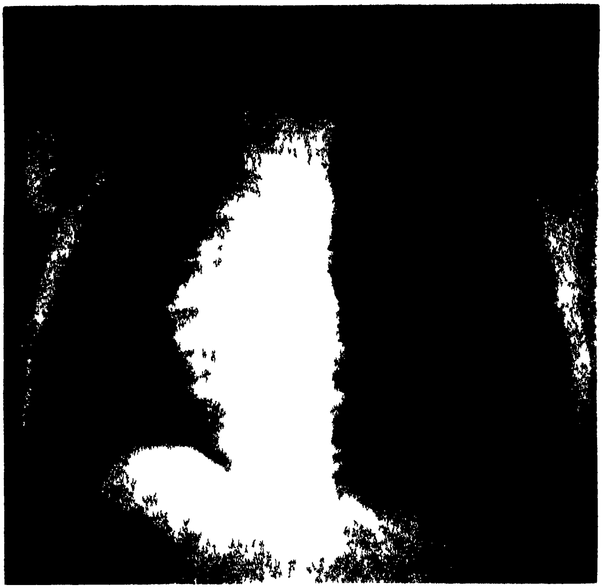

FIGURE 3. R K Multiple cavities on left (film reversed)

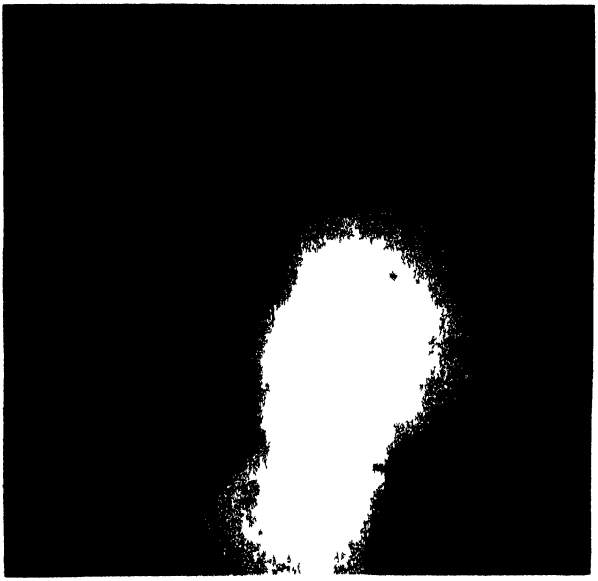

FIGURE 4. R K.—Postoperative combined pneumonectomy and thoracoplasty. Note that both ribs 1 and 2 are intact.

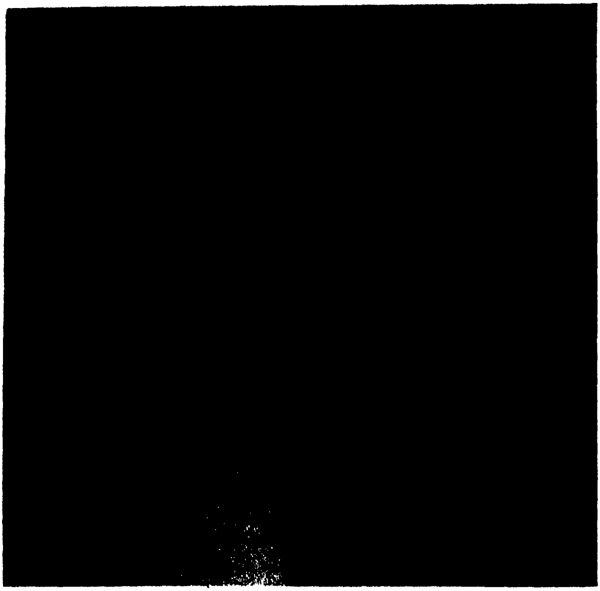

FIGURE 5. R. K. - Postoperative appearance showing minimal deformity.

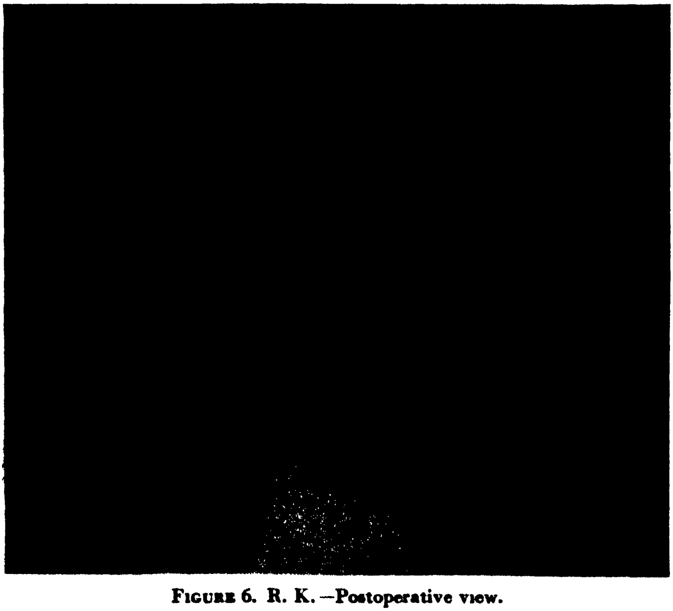

FIGURE 6. R. K. —Postoperative view.

Case 3: F. A., white male, 51 years of age. Admitted August 3, 1948, with chief complaints of severe cough productive of 12-16 oz. of bloody sputum daily for 3 weeks. Weight loss of 15 pounds.

History of treatment in a Brooklyn hospital in 1942, for a right lower lobe abscess. Apparently completely recovered after 5 months hospitalization, although chest films also revealed the presence of a large right upper lobe cyst.

Previous admission here in October 1946, when chest films revealed a huge right lower lobe abscess, and a large right upper lobe cyst. Pneumonectomy was considered, but seemed too hazardous in view of the patient's poor general condition, copious expectoration, and contralateral emphysema. Wide open drainage was therefore instituted in November 1946. Residual broncho-pleural fistulae were closed by a pedicled muscle flap in March 1947. Patient returned to full-time work as a crane operator in May 1947, and remained well until 3 weeks before the present admission.

Chest film on the present admission revealed several small lower lobe abscess cavities, and the right upper lobe cyst which showed no apparent change from previous films. The right lung was contracted and the left lung moderately emphysematous.

Patient placed on penicillin by both intramuscular and aersol routes with marked improvement in his condition— particularly in reduction of sputum output. He was prepared for surgery and on September 8, 1948, right pneumonectomy and thoracoplasty were performed. Despite the long and tedious dissection necessary to remove a lung completely "frozen" to the chest wall, the patient tolerated pneumonectomy extremely well. Thoracoplasty was then performed Because of the patient's barrel-type chest, generous posterior segments of ribs 2 through 8 were resected to produce satisfactory collapse.

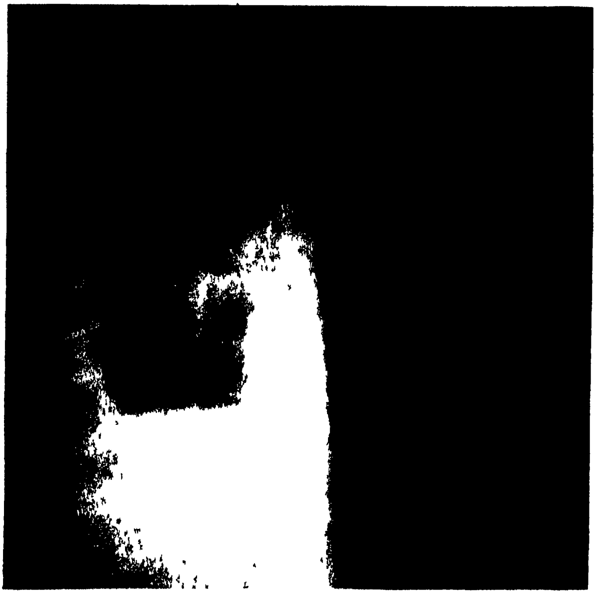

FIGURE 7. F. A.—Upper lobe cyst and huge right lower lobe abscess, October 1946.

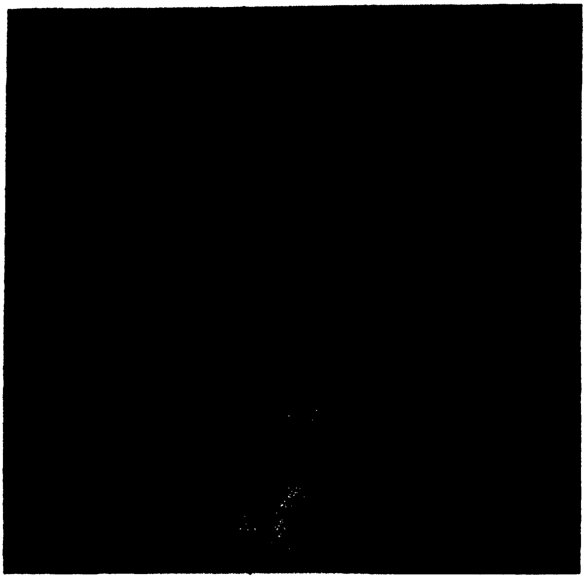

FIGURE 8. F. A.—Lateral view of cyst and abscess, October 1946.

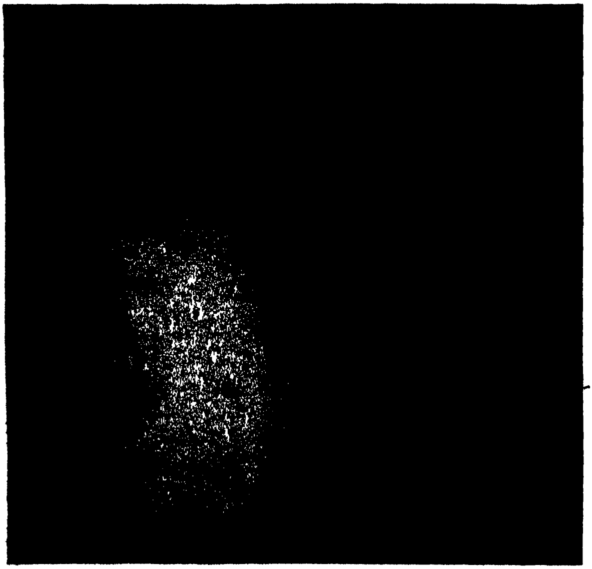

FIGURE 9. F. A.—Large right upper lobe cyst. Recurrence of right lower lobe abscess, August 1948.

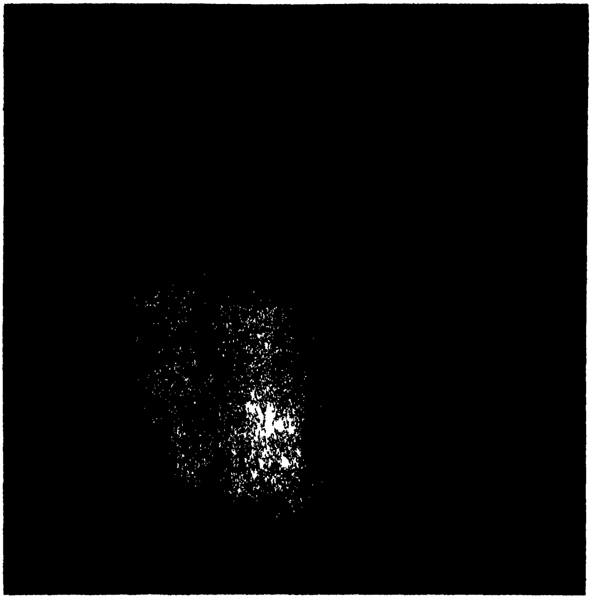

FIGURE 10. F. A. —Postoperative combined pneumonectomy and thoracoplasty.

Convalescence was uneventful Temperature reached a high of 101.4° F. on the second postoperative day, and returned to normal on the fourth day. Patient was ambulant on the third postoperative day. The wound healed per primam. Cough and expectoration were negligible Only complaints were moderate pain and stiffness in the right shoulder which are responding to physiotherapy.

Summary

The cases of three patients who have undergone total pneumonectomy and extensive thoracoplasty at a single operation have been presented, together with a description of the operative procedure and pertinent details of pre- and postoperative management. An unusually benign postoperative course was noted in all the patients.

It appears that this combined procedure presents several advantages:

1. The necessity for only one operation and shorter hospital stay are extremely desirable.
2. In the tuberculous patient, prompt obliteration of the pleural cavity should greatly lessen the dangers of bronchial fistula and empyema.
3. Mediastinal displacements with their disturbances in respiratory physiology, overdistention of remaining lung, etc., are avoided.

4. A more effective coughing mechanism appears to be present in the immediate postoperative period. This should lessen pulmonary complications.

We do not wish to convey the impression of advocating this combined procedure in every case presenting indications for both penumonectomy and post-pneumonectomy thoracoplasty. Decision will depend almost entirely on evaluation of the patient's condition upon completion of the peneumonectomy.

We wish to emphasize also that this is a preliminary report, and that we do not know what the late results will be. We have reason to believe they will be satisfactory. If there are any latent dangers in the procedure, they have not appeared up to the time of this report.

NOTE: Since submission of the above article for publication, the combined pneumonectomy and thoracoplasty has been performed in a single stage on four additional patients. Two of these patients had extensive pulmonary tuberculosis, one had bronchiogenic carcinoma, and one had both pulmonary tuberculosis and bronchiogenic carcinoma. The subsequent course of these patients has been equally satisfactory to those reported.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 15, 1949*

Of the total of 4,086 cases of influenza reported (last week 4,136, 5-year median, 1944–48, 10,360), 3,434 occurred in 4 States, as follows (last week's figures in parentheses): Virginia 500 (347), South Carolina 502 (505), Arkansas 277 (175). Texas 2,155 (2,300). Only one other State, Arizona (129), reported currently more than 68 cases. The total for the first 2 weeks of the year is 8,222, as compared with 20,695 for the same weeks last year, which latter figure was also the 5-year median.

A total of 11,609 cases of measles was reported, last week 11,341, 5-year median 5,314. An aggregate increase of 1,482 cases occurred in the Middle Atlantic, North Central, South Atlantic, and Pacific areas, partly offset by a decrease of 1,214 in the New England, South Central, and Mountain areas. The largest numbers were reported in Texas, 1,585, Massachusetts, 1,435, New York, 1,005, and Virginia 645. The total for the first 2 weeks of the year is 22,950, as compared with 21,996, the largest comparable figure of the past 5 years (reported in 1944), and a 5-year median of 8,083.

Of 143 cases of poliomyelitis, the same number as reported last week (5-year median 40), California reported 62 (last week 57), Texas 9, Washington 7, and New Jersey 5. No other State reported more than 4 cases for the week. The total for the first 2 weeks of the year is 286, 5-year median 84.

New York reported 2 cases of anthrax during the week, and Alabama 1 case of Rocky Mountain spotted fever. A total of 53 cases of tularemia was reported, last week 37, 5-year median 32. The cumulative figure is 90 cases, 5-year median (reported last year), 64.

Deaths recorded during the current week in 92 large cities in the United States totaled 9,827, as compared with 10,723 last week, 10,131 and 9,952, respectively, for the corresponding weeks of 1948 and 1947, and a 5-year median of 10,136. For the first 2 weeks of the year the total is 20,550, same period last year, 21,420. Infant deaths totaled 712, last week 706, 5-year median 670, cumulative figure 1,418, corresponding weeks last year, 1,500.

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* Information has been received that the case of suspected epidemic typhus fever in Tampa, Florida (Public Health Reports January 28, p 110) was definitely not epidemic typhus fever

Telegraphic case reports from State health officers for week ended Jan. 15, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever d	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine				217		9			18				6	
New Hampshire	1		2	2		2			7					
Vermont				183			1		14				23	
Massachusetts	10			1 435	1	16			237				79	
Rhode Island				125		7			7				2	
Connecticut	1			127		61	1		41				9	
MIDDLE ATLANTIC														
New York	12		b 3	1 005	7	334	2		237			1	148	8
New Jersey	2		6	262	6	103	5		135				63	3
Pennsylvania	13		(b)	689	6		1		236			2	73	2
EAST NORTH CENTRAL														
Ohio	4		7	54	2	55			238				41	15
Indiana	8	1	18	131	1	19			49				14	13
Illinois	1		1	52	4	86	3		170		8	1	19	2
Michigan a	3			310	1	58	3		282				44	1
Wisconsin			8	426	5	4	3		65		2		61	
WEST NORTH CENTRAL														
Minnesota				16	1	5	4		63				2	
Iowa	1	2		7		4	3		34				9	1
Missouri	2		3	245	1	25	1		33		5		7	
North Dakota	1			20	1		1		11				1	
South Dakota				2			4		1					
Nebraska			3	10		4	1		20				7	
Kansas	1		6	313	1	17	1		33				3	
SOUTH ATLANTIC														
Delaware	3			10	1	2			4					
Maryland a	1		1	537	3	48			34		1		19	
District of Columbia				45		11			8				2	
Virginia	4		500	645	3	128	1		20		1		40	1
West Virginia	2		56	198	3	12	1		25			2	12	
North Carolina	9			202	3		1		37		5		36	
South Carolina	10		502	24	1	121	1		3		4	3	15	2
Georgia	6		9	71	1	13			23		7	1	2	9
Florida	6		12	70	2	32	4		5				6	2

EAST SOUTH CENTRAL														
Kentucky	5		3	98	7	40	1		55		2	2	21	1
Tennessee	4	1	49	77	6	79	1		37		7	1	25	
Alabama	9		53	219		58	4	1	13		1		5	10
Mississippi [a]	9		24	27	4	37			13		2		12	
WEST SOUTH CENTRAL														
Arkansas	13		277	142	1	61	2		6		1	2	9	6
Louisiana	6		34	4	1	35			5		3	7	1	
Oklahoma	2		68	79		23	3		6					5
Texas	18		2 155	1 885	7	400	9		32		3	2	110	26
MOUNTAIN														
Montana	2			22					19			1	2	
Idaho		1	6	55		1	2		15				2	
Wyoming		1	1	9		2			8					
Colorado	2		69	8	2	44	1		13				16	
New Mexico			2	[illegible]		18			3			1	13	
Arizona	1		129	50		24			4				13	
Utah [a]			6	143		1	4				1		4	
Nevada				4										
PACIFIC														
Washington	3			534	2	3	7		53				15	
Oregon	1		45	501	1	42	5		22				18	
California	6		21	564	6	50	62		80			3	54	6
Total	182	6	4 086	11 609	91	2,113	143	1	2 476		53	29	1 062	
Median 1944-48	340	8	10 360	314	251		40	0	2 722	5	32	43	2 263	
Year to date 2 weeks	340	16	8,222	22,950	164		289	1	4 495	1	90	65	1 984	
Median 1944-48	706	13	20 695	8 083	453		84	0	5 105	9	64	81	4 097	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 18		(11th) Mar 20		(32d) Aug 14	(35th) Sept 4		(11th) Mar 20	(39th) Oct 2	
Since seasonal low week	5 454		44 492	75 343	1 008		27 613		27 193	16		3 184	12 017	
Median 1943-48	8 272		64 253	34 207	1 9[illegible]7		13 448		43 676	8		4 332	29 546	

---

[a] Period ended earlier than Saturday

[b] New York City and Philadelphia only respectively

[c] Including cases reported as streptococcal infection and septic sore throat

[d] Including paratyphoid fever reported separately as follows South Carolina 1 Louisiana 1 California 1 Salmonella infections not included were reported as follows Massachusetts 2 New York 1

Anthrax New York 2 cases
Alaska Scarlet fever 3 streptococcal throat 2
Territory of Hawaii Influenza 3 measles 366 poliomyelitis 1

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended December 25, 1948.—During the week ended December 25, 1948, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		24	1	255	517	44	159	63	139	1,202
Diphtheria				10	8	2	4			24
Dysentery										
Amebic					1					1
Bacillary							3			3
Encephalitis, infectious							2			2
German measles				28	34		7	3	15	87
Influenza		1							3	4
Measles		31	3	164	56	89	33	80	124	580
Meningitis, meningococcal				2						2
Mumps		1	2	38	177	57	22	9	45	351
Poliomyelitis						1		1	2	4
Scarlet fever		2	3	145	33		2	12	2	199
Tuberculosis (all forms)		2	4	92	2	13	4	15	44	176
Typhoid and paratyphoid fever				3	1				2	6
Undulant fever		1			1					2
Venereal diseases										
Gonorrhea		7	5	50	59	29	5	24	48	227
Syphilis		9	4	61	42	20	4	5	7	152
Whooping cough				97	5		2	4		108

MADAGASCAR

Notifiable diseases—November 1948.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during November 1948 as follows:

Disease	November 1948			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri-beri			48	0
Bilharziasis	1	0	133	0
Cerebrospinal meningitis			6	1
Diphtheria			2	0
Dysentery				
Amebic	3	0	360	5
Bacillary	2	0	21	0
Erysipelas			22	1
Influenza	6	0	2 421	50
Leprosy			41	0
Malaria	303	4	32 913	250
Measles	4	0	119	0
Mumps	1	0	95	0
Plague			15	12
Pneumonia, broncho	1	0	200	47
Pneumonia, pneumococcic	2	2	397	85
Puerperal infection	1	0	2	0
Trachoma	1	0	2	0
Tuberculosis, pulmonary	4	1	86	11
Typhoid fever			11	0
Whooping cough	2	0	114	0

NETHERLANDS

Amsterdam—Psittacosis. During the week ended December 18, 1948, 4 cases of psittacosis were reported in the city of Amsterdam, Netherlands.

INFLUENZA IN EUROPE

Information received January 8-14, 1949, states that widespread epidemics of a mild type of influenza have been indicated in reports from Italy, South Holland, and France. In Switzerland 13 cantons, principally Tessin and Geneva, were involved, also Bale City. Influenza is also stated to be prevalent in Vorarlberg in the Austrian Tyrol. Some cases were reported in certain towns in Turkey, but not in epidemic proportions. A few cases were reported in London, but no epidemic is evident in United Kingdom, Scandinavia, Spain, Hungary, Ireland, Poland Portugal, or the American Zone of Germany.

In France about 20 percent of the population is stated to be affected. In half the cases investigated "A" type virus was identified. "A" type virus was also identified in South Holland.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

India. Information dated January 4, 1949, reports an outbreak of plague in the Belighata district of Calcutta, India. On that date 2 cases were reported in that district, bringing to 5 the total number of cases reported during the outbreak. On the same date a report from Patna, Bihar State, stated that an outbreak of pneumonic plague had occurred in Gaya, where 18 deaths from that malady had been reported.

Indochina (French)—*Cambodia State—Pnompenh.* During the week ended January 1, 1949, 2 cases of plague were reported in Pnompenh, Cambodia State, French Indochina.

Smallpox

Brazil.—During the period January 1-July 31, 1948, 430 cases of smallpox with 8 deaths were reported in Brazil. For the period July 1-31, 1948, 38 cases were reported in Rio de Janeiro.

China—Amoy.—During the recent outbreak in Amoy, China (see Public Health Reports for January 14, 1949, page 67, smallpox was reported October 17–December 20, 1948, as follows: October 17–20, 1 case; November 1–10, 5 cases; November 11–20, 25 cases, 2 deaths; November 21–30, 104 cases, 10 deaths; December 1–10, 106 cases, 7 deaths; December 11–20, 21 cases, 3 deaths.

Ecuador.—During the period January 1–October 15, 1948, 3,315 cases of smallpox (including alastrim) with 190 deaths were reported in Ecuador.

India.—Smallpox has been reported in cities in India as follows: Week ended December 18, 1948, Ahmedabad 36 cases; week ended January 1, 1949, Madras 14 cases, Bombay 7 cases, Cawnpore 2 cases.

Iraq.—For the week ended January 1, 1949, 50 cases of smallpox were reported in Iraq.

Syria.—Smallpox has been reported in Syria as follows: Week ended December 18, 1948, 76 cases, including 16 cases in Damascus, 15 cases in Homs, and 11 cases in Aleppo; week ended December 25, 86 cases.

Yellow Fever

Panama.—Information received on January 17, 1949, reports 8 cases of yellow fever with 6 deaths (2 confirmed) near the town of Pacora, which is approximately 25 miles from Panama City. Of the two deaths confirmed one was stated to have occurred in November 1948, and one in December.

DEATHS DURING WEEK ENDED JAN. 8, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Jan. 8, 1949	Corresponding week, 1948
Data for 94 large cities of the United States		
Total deaths	10,790	11,377
Median for 3 prior years	11,377	
Deaths under 1 year of age	709	822
Median for 3 prior years	822	
Data from industrial insurance companies		
Policies in force	70,647,007	66,844,594
Number of death claims	12,148	14,153
Death claims per 1,000 policies in force, annual rate	9.0	11.1

Examinations for Engineer Officers

Competitive examinations will be held April 11, 12, and 13, for appointment of engineer officers in the Regular Corps of the Public Health Service in the grades of junior assistant sanitary engineer (second lieutenant), assistant sanitary engineer (first lieutenant), and senior assistant sanitary engineer (captain).

Duty assignments include general sanitary engineering, water pollution control, industrial hygiene, malaria and typhus control, milk and food sanitation and environmental health research activities.

Entrance pay for the junior assistant grade with dependents is $3,391 a year; assistant grade with dependents, $3,811 a year; and senior assistant grade with dependents, $4,489 a year. Additional pay for service includes a 5 percent increase in base pay for every 3 years of service (time served in the past as an active or inactive member of the Armed Forces is credited). Promotions are made at regular intervals up to and including the grade of senior sanitary engineer which corresponds to the rank of lieutenant colonel, at $7,019 a year.

A junior assistant applicant must be a United States citizen at least 18 years old, and have a degree in one of the several branches of engineering from a school of recognized standing. (Undergraduate engineering students in the senior year may take the examination, but successful candidates will not be placed on active duty until graduation). An assistant applicant, in addition, must be at least 21 and have had at least 7 years of educational and professional training or experience subsequent to high school At least 2 of the 7 years must be qualifying professional training or experience in public health or an acceptable related field. Additional qualifications for a senior assistant applicant are: 10 years of educational and professional training or experience subsequent to high school, at least 4 of the 10 years must be qualifying professional training, or employment in an official or nonofficial health agency or in an activity related to the field of public health.

The written professional examinations for the three grades will be based on the listed subjects as they relate to study courses generally provided in engineering schools of recognized standing for the junior assistant; to the professional training and experience requirements for the assistant grade; and to air hygiene, water, liquid and solid wastes, milk and food and vector control for the senior assistant grade.

(1) Basic science principles (including chemical, biological, physical and social sciences); (2) basic science application; (3) engineering practices; (4) public health methods and procedures; (5) specialty.

Application forms and additional information may be obtained from the Surgeon General, Public Health Service, Washington 25, D. C., Attention· Division of Commissioned Officers. Applications must be received before March 18. The written examination will require approximately 3 days and will be held at designated Public Health Service facilities at various cities throughout the United States. Transportation expenses to and from, and the cost of maintenance at the place of examination must be assumed by the applicant.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

Librarians and others should preserve their copies for binding, as the Public Health Service is unable to supply the general demand for bound copies. Indexes will be supplied upon request

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PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
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Public Health Reports

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The British National Health Service

By Burnet M. Davis, M. D., *Division of Public Health Methods, Public Health Service*

This paper is an attempt to present a factual account of the British National Health Service, based upon study of the National Health Service Act, 1946,[1] the regulations made under authority of the act, administrative directives and other official documents, publications of the British Medical Association and newspaper reports, and upon observations made in England during the period immediately preceding the coming into operation of the act. No attempt is made to pass judgment on either the desirability or feasibility of the program, or to appraise its operation; the latter would require observation at some future date when the adjustments of the transitional period are completed.

The author is indebted to Sir Wilson Jameson, Chief Medical Officer of the Ministry of Health, London, and to numerous other officers of the Ministry, both administrative and medical, especially Drs. G. E. Godber and A. L. Banks, for their help in making information available; to Dr. Charles Hill and other officers and members of the British Medical Association for similar courtesies; and to members of the staff of the Public Health Service and the Social Security Administration for their helpful suggestions.

Scope and Background

The National Health Service came into operation in Great Britain on the "appointed day",[2] July 5, 1948. The public learned in a leaflet (*1*) distributed to every household during April, that the Service

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[1] The National Health Service (Scotland) Act, 1947, enacted by Parliament somewhat later but coming into effect on the same date as the English Act, provides the statutory basis for a similar health service in Scotland. This paper deals with the health service for England and Wales; the relatively few points of difference of the Scottish Act do not warrant special discussion in a paper of this scope.

[2] This term is used in the act to denote the day on which the act was to come into operation. The date was not specified in the act but was fixed by an Order in Council.

> "will provide you with all medical, dental, and nursing care. Everyone—rich or poor, man, woman or child—can use it or any part of it. There are no charges, except for a few special items. There are no insurance qualifications. But it is not a 'charity.' You are all paying for it, mainly as taxpayers, and it will relieve your money worries in times of illness."

Looked at in more detail from the patient's viewpoint, what does the new service offer?

General Practitioner Care

For more than half of the adult population the method of obtaining family doctor services remains virtually unchanged. Since 1912 nearly all employed adults have been covered under National Health Insurance for this portion of their medical care. The arrangements are very simple for the consumer: He selects a doctor from the local list of those who have agreed to participate, fills out an application form and gives it to the doctor chosen. From then on he is eligible to receive general practitioner care from that doctor, or from any other participating doctor in an emergency or when away from home. He may change to another doctor by giving written notice. He visits or is visited by his general practitioner for all general care required, but pays no fees. A major change from National Health Insurance is the fact that all persons—not merely employed adults—are now eligible. All members of a family do not necessarily select the same doctor, although children under 16 have theirs chosen by their parents.

Hospital and Specialist Care

Hospital and specialist care were not included at all under National Health Insurance. Hospital care was available to persons of low and moderate income through a variety of channels. Many persons in the lower income groups voluntarily subscribed to the local contributory plans, somewhat like Blue Cross in the United States, paying a few pence a week to be eligible for ward care without charge in a voluntary hospital. In recent years counties and some municipalities have had public hospitals at which the charges made to local residents were in proportion to their ability to pay, but never exceeded actual cost. The quality of such municipal hospital care available varied in different localities. Higher income groups have customarily been served by private "nursing homes" usually operated on a profit-making basis and seldom as well equipped as the larger voluntary and municipal hospitals.

In the years before the war, groups of private rooms were added to some voluntary hospitals, so that the specialist staff would have accommodation for their private pay patients in the institution where they did their "charity" work. The private rooms will continue to be available for patients who wish to pay for their care privately, and private nursing homes may still operate entirely outside the public service. Everyone, however, is entitled to hospital care without charge, and it is certain that only a relatively small fraction of the population will elect to pay for private care. The portion of the public most conscious of the change, perhaps, is the middle-class group which has been ineligible for free care in voluntary hospitals but has found the cost even in municipal hospitals very burdensome.

Except for the private consulting practice serving the upper income groups, specialist care in England has been rendered chiefly through hospital in- and out-patient service. Now that specialists are paid from public funds, it is expected that specialist care will be available to many persons who have not had access to it in the past. Arrangements for specialist and hospital care are made by the general practitioner when he deems such care necessary.

Drugs and Appliances

Prescription drugs are furnished without charge as a part of the general practitioner service. Eyeglasses and necessary appliances such as hearing aids and artificial limbs are provided also, through appropriate medical channels.

Preventive and Special Services

Preventive public health services continue in the new service to be provided by local health departments, although the patient may now ask for some of these personal services from his family doctor. Local health departments may furnish certain services and equipment required because of illness in the family. Domestic help may be provided—at cost if the family can afford to pay for it—and special sick-room equipment needed for home care supplied. Nursing in the home is now furnished without charge, to an extent limited by available staff. This service in the past has been provided chiefly by district nursing associations, and paid for by voluntary contributions plus a nominal charge for services rendered. Large numbers of people have contributed on a regular weekly basis to the district nursing associations; these contributions are no longer necessary for eligibility for free service. Ambulance and other transportation necessitated by illness is also included.

Dental Care

Dental care is mentioned in the quotation above. In relation to population, dentists are even scarcer in England than in the United States. A person seeking dental care must find a dentist willing to undertake the required work, and the dentist's fee is paid from public funds at no cost to the patient unless he elects to have more expensive types of fillings or dentures than are required on clinical grounds.

Background

Review of the background of the National Health Service indicates that it is not nearly so great an innovation for Britain as would a similar plan be in the United States. National Health Insurance has been in operation since 1912, and although at its inception it was viewed with suspicion, especially by the medical profession, it has been accepted for many years by the public and by the profession as a great improvement on what preceded it. In 1930 the British Medical Association proposed extension of N. H. I. to cover dependents of insured persons and this proposal was repeated by the B. M. A. in 1938 (*2*). Legislative action, but not study of the problem, was prevented by the war, and in 1942 the Medical Planning Commission (appointed jointly by the B. M. A. and other medical organizations), recommended in its report a comprehensive health service (*3*). The Churchill coalition government published in 1944 a White Paper in which it proposed that

> "the care of personal health should be put on a new footing and be made available to everybody as a publicly sponsored service" (*4*).

During the same year the coalition government issued a White Paper on social insurance in which a broad program designed to implement the well known Beveridge plan was proposed. Thus the National Health Service Act and the National Insurance Act, which came into operation simultaneously, represent reforms which were generally accepted as desirable. The details of the legislation passed by the labour Parliament differed at many points from the White Paper proposals, but the general principle of a comprehensive health service was not challenged by any political party or by the B. M. A.

After passage of the National Health Service Act in November 1946, vigorous opposition was voiced by the B. M. A. to certain provisions of the act and of the regulations which the Minister of Health proposed. Four major points were at issue, three of which were largely resolved by compromise by the end of May 1948, when the representative body of the B. M. A. met and gave approval to participation in the service (*5*). These points were: (1) Payment of a "basic salary" of £300 to all general practitioners, specified in the regulations. The B. M. A. feared that this would be but a first step toward a fully salaried service. The regulations were amended to allow the annual £300 payment only to practitioners requesting and giving justification for it, and an agreement was reached to amend the act to prohibit introduction of a salaried service by regulation. (2) Power of the Medical Practices Committee to prevent a doctor's locating in the area of his choice, a power which will remain, but will be administratively limited to a few "overdoctored" areas. (3) Prohibition of sale and purchase of medical practices. Many doctors favored this provision of the act, but it was feared that its application would result in limiting freedom to choose partners, assistants, and successors. The government gave assurance that these limitations would not be imposed. (4) Right of a practitioner to appeal to the courts against dismissal from the service by the Tribunal; no concession was made on this point.

When the Health Service came into operation, a large majority of the medical profession had agreed to participate, and the government in consultation with the B. M. A was drafting a bill to effectuate the compromises which had been reached and to clarify portions of the act on which questions of interpretation had been raised.

Professions and Institutions

General Practitioners

The new service will greatly decrease the amount of private fee-earning work, but will increase payments to doctors from public funds. The general effect will be to decrease the variation in, but by no means equalize, general practitioners' incomes, because the doctor receives his pay, as under National Health Insurance, on a capitation basis—that is, a fixed amount per quarter per person on his list. The extent to which the individual doctor will feel the change will depend on his type of practice. In industrial areas, the private patients a doctor will lose will be mostly dependents of wage earners, who were able to pay little in the past. In return, he will gain payment on behalf of these patients from public funds. In wealthier neighborhoods, some doctors will find that their loss of private fees is not fully replaced by income from the public service.

Quantitative evaluation of the change to be expected in general practitioners' incomes is complex and difficult. The expressed aim of the government is to implement, by the scheme of payments, the recommendations of the Spens Committee (*6*) which have been accepted by the British Medical Association. These recommendations would increase substantially the income of most general practitioners.

The act may have an important influence on general practice by abolishing the custom of buying and selling practices. The prevalence of this custom in Britain has been closely related to the existence of N. H. I.; when an insurance practice changed hands, the patients on the retiring doctor's list automatically became patients on the new doctor's list. Although the transferred patients were notified of the change, and were permitted to transfer to any other doctor, very few actually transferred, Thus a doctor purchasing a practice with a substantial number of insured patients was virtually assured of an immediate income corresponding to that number of capitation fees.

The cash purchase of practices meant that the young doctor entering general practice had to make a substantial capital investment to procure a practice. On the other hand, the elderly doctor counted on selling his practice on retirement (or having his widow sell it, if he died before retiring) to provide him (or his widow) with a cash retirement fund. The statutory prohibition of sale of practices will relieve young practitioners of the need for capital, and a universal pension scheme will protect the retiring doctor. In addition, the law provides cash compensation, payable on death or retirement, to all doctors enrolled in the program at its inception on July 5, for loss of the right to sell their practices.

Doctors are concerned not only with remuneration. There is also fear that free service will increase the practitioner's patient load, perhaps to an extent not consistent with a good standard of medical care. Since many doctors were overworked before July 5, this fear is not without foundation. But there is another view of this hazard—to quote the *Lancet*, the doctor can now

> "allocate his efforts more according to medical priority. The money barrier has of course protected him against people who do not really require help, but it has also separated him from people who really do: and only time can show the relative proportions of the two classes"(7).

What will be the effect on a doctor's freedom to practice where and as he chooses? Doctors in practice on the appointed day have a statutory right to continue where they are. Those entering practice for the first time, or changing their location after the appointed day do so subject to the approval of the Medical Practices Committee, seven of whose nine members are medical. Only if the number of practitioners in an area is already adequate, however, may the Committee refuse to admit a doctor to that area. Since at present very few areas in England are "overdoctored," it is expected that this power of "negative direction" will only rarely be exercised. Usually doctors will move to fill vacancies caused by death or retirement, just as they have done in the past.

Partnership arrangements have been very common in British practice. The government has given assurance that doctors will be free to choose their partners and assistants as in the past.

The proposal under the new act to build "health centers" at public expense to furnish office accommodation and ancillary help for groups of practitioners and for public health activities has been looked upon with general favor. However, because priority for building materials and labor is being given to dwellings, only a few experimental health centers can be constructed during the next several years.

The majority of general practitioners have been familiar with insurance practice and its professional and administrative routines during all or most of their years in practice. Under N. H. I. they have dealt administratively with the local "Insurance Committee," which has now been replaced by a body known as the Executive Council. This local council has a much larger representation of the professions concerned than did its predecessor. The old insurance committees, which had from 20 to 40 members, had as few as four medical members, and no dentists or pharmacists, whereas the new executive councils, with 25 members each, must have at least 7 medical, 3 dental, and 2 pharmacist members. Much of the work of the executive council, such as maintenance of lists of doctors and patients, making payments to doctors, etc., will be very similar to that of the insurance committees. Most of the former officials of the insurance committees are now employed by the executive council of the corresponding area, so that practitioners will usually deal with the same individuals in the administration of the new service.

The terms of service to which participating general practitioners must subscribe, the method of payment, and arrangements for handling complaints and discipline are virtually unchanged from the old system, so that doctors who have had insurance patients in the past will find little that is unfamiliar in administrative procedures. Perhaps the most fundamental difference is that there will now be little medical work outside the public service; thus a doctor who does not wish to participate may find difficulty in making a living unless he is exceptionally well established. In these circumstances it is very important that the doctors have a strong professional organization with long experience in negotiating with the government, and that they are well represented in the various administrative and advisory bodies concerned with the health service.

Hospitals

Consideration of the effect of the act on hospitals requires a brief description of the hospital system before the appointed day. Hospitals were divided into three main categories—"voluntary," local government, and private—on the basis of their sources of financial support. Voluntary hospitals, organized on a nonprofit basis, were originally supported chiefly by large endowments and bequests, but in more recent years have relied heavily on the voluntary contributory plans referred to above, as well as on annual fund-raising drives. It should be emphasized that the voluntary hospitals in England have not generally received nearly as large a proportion of their funds from payments by patients as do American hospitals. In most instances they have offered only ward service, and have not been able to charge private patients enough to help pay for the care of nonpaying patients. Although during the war they received substantial government help through payment of costs for care of many patients under the Emergency Medical Service, falling investment income as well as increased operating costs have brought these hospitals to increasingly difficult financial straits.

The voluntary hospitals were administered by self-perpetuating boards of trustees or governors, serving without pay, while-day-today operations were in the hands of a paid superintendent, usually a layman. Professional services to patients were provided generally by specialists serving on a part-time voluntary basis, with a staff of house officers assisting in the care of patients in the course of their internship and residency training.

Undergraduate medical teaching was carried out mostly in the large urban hospitals, many of which had their own medical schools, usually associated with a university. The University of London has several hospital medical schools associated with it, as well as numerous special hospitals which teach special clinical subjects but do not themselves contain medical schools. Graduate medical teaching is similar to that in the United States, through house appointments corresponding to internships and residencies.

Hospitals operated by local governmental units (referred to in England as local authority or municipal hospitals) were expanding rapidly when new construction was stopped by the war in 1939. These institutions included general hospitals, especially in the larger cities and counties, and special hospitals for maternity, infectious diseases, tuberculosis, mental disease, and the "chronic sick." These hospitals were financed from "rates" (local taxes), since payments by patients, at charges varying from actual cost to nothing, never met full operating costs. These institutions were managed by the public health or public assistance committee of the local government council (or by a subcommittee of the council's public health committee). The larger hospitals commonly had a medical superintendent, and mental hospitals were required by law to have one.

The mental and tuberculosis hospitals operated by local authorities were generally staffed by full-time salaried doctors. A few of the general hospitals in this category were similarly staffed, but the prevailing arrangement was employment of senior staff on a part-time basis, with full-time resident house staff.

The third type of hospital was the "nursing home," operated for profit by a private individual, partnership, or corporation. These homes furnished most of the private-room care in British institutions, although in recent years there had been a tendency to increase private accommodations in some voluntary hospitals. Specialists caring for ward patients in voluntary hospitals usually had to take their private patients to nursing homes for surgery or other treatment requiring hospitalization.

Church hospitals played a very minor role in England, as compared with the United States. Most of them were more like nursing homes than community hospitals.

The term "cottage hospital" needs a word of explanation. Cottage hospitals are those in which patients are under the charge of general practitioners rather than specialists, although the latter may, of course, be called in consultation. These hospitals are usually small, and tend to be located in the smaller towns.

All voluntary and local authority hospitals became the property of the central government on the appointed day. The first effect of this change in ownership was to relieve the voluntary hospitals of a burden of increasing deficit which could not have been borne much longer. The local authority hospitals were of course already dependent to a large extent on public funds, but the deficits of many voluntary hospitals were so serious that the government in effect had to advance funds to keep the hospitals in operation even before the appointed day. One of the major problems of administration of the voluntary hospitals—fund-raising—has thus been eliminated. This activity required a large amount of effort on the part of the boards of trustees and the administrative staffs of hospitals. In addition, the hospital contributory schemes, some of which were operated directly by hospitals, others as independent organizations in contract with hospitals, are no longer needed as a source of hospital revenue. Some of them will no doubt continue to offer insurance contracts to pay for supplementary cash benefits or for private beds in hospitals and nursing homes.

Another important change is the removal of eligibility requirements for admission to specific hospitals. In the past, voluntary hospitals admitted chiefly persons of low income. The local authority hospitals, on the other hand, limited admissions strictly to the residents of their city or county areas, with unfortunate results in some instances. For example, in the county area surrounding a large city, patients have been transported to a distant county hospital because they were ineligible for admission to the good hospitals of the nearby city. Eligibility is now unrestricted, and admission will depend on medical necessity and the suitability of a given hospital for care of the particular patient.

The introduction of the new service will undoubtedly increase the work load of hospitals. Persons who have postponed elective surgery, for example, because of its cost, are now eligible for surgical care free of charge. Moreover, some general practitioners, no longer having a direct financial interest in continued treatment of their patients, may tend to refer them more freely to hospitals for out-patient specialist care or in-patient study and treatment. The most critical problem of overload is feared in the care of the chronic sick, since institutions for this type of case were already full before the appointed day, and there will now be much pressure for admission of patients cared for under difficulties in the home.

The problem of overloaded hospitals is the more serious because of the very small amount of new hospital building which can be undertaken in the near future, and critical shortage of staff, especially nurses. Because of these staff shortages many hospital beds were out of operation before the appointed day.

Although the increased pressure for hospitalization will create many problems for hospital administrators and professional staff, the service will introduce other factors which may result in more effective utilization of the admittedly limited facilities. With removal of financial barriers and geographical eligibility requirements it should be possible to admit patients to hospitals on the basis of medical need, thus increasing the usefulness of hospitals. Planning on a regional basis the part which each institution is to play in the whole scheme, if effectively done, can also increase efficiency in the use of beds and specialists. Greater mobility and transferability of staff will result from uniform pay scales and pension rights in all hospitals in the service, and some impetus may be given to recruitment of married and otherwise retired nurses.

Special provision is made in the act for the administration of teaching hospitals, as will be described below. Some of these hospitals will lose administrative identity through amalgamation with others, but little change in clinical or teaching functions is anticipated. It is hoped that closer working relationships will be developed between teaching and nonteaching hospitals to the benefit of both.

Specialists

Specialists, from the standpoint of the purely professional aspects of their work, will find little change under the new service. They will continue to do most of their work in hospitals and out-patient clinics, seeing patients referred by general practitioners. Some individuals may be asked to concentrate their work in a smaller number of hospitals than in the past, and some may be asked to visit hospitals which have not heretofore had adequate coverage. These efforts toward rationalizing the use of specialists will necessarily come gradually, as the needs become apparent to the boards and committees responsible for administration of the hospital and specialist service.

Financially, specialists will find many changes. Their pay from hospitals in the past has varied from the traditional free service to substantial sessional or operative fees. A few municipal hospitals have been staffed with whole-time salaried specialists, but the commoner practice of municipal hospitals has been payment on a sessional basis. Voluntary hospitals have been slower to adopt any scheme of payment, although during the recent war the central government began paying specialists for services rendered to hospital patients under the Emergency Medical Service (for civilian casualties, evacuees, etc.). Under the new arrangements, all specialists will receive payment, in accordance with nationally negotiated scales of payment and terms of service, for the public work they undertake. The general scales of pay to be aimed at have been set forth in the report of another Spens Committee (*8*), but the details of payment to individuals are yet to be determined. In the meantime payment is being made on a simple interim arrangement, subject to retroactive adjustment when the negotiations are completed.

It seems likely that private work will decline to an extent which may mean net loss of income to many specialists. On the other hand, the median income of specialists will be increased, chiefly because of equalization of scales among the several specialties.

An important feature of the Spens Committee recommendation is that doctors undergoing hospital training for specialty work (corresponding to American residency appointments) will receive substantial salaries instead of the nominal stipends traditional in both this country and England. These salaries, in the opinion of the committee, will make it possible for able individuals without independent means to get full specialist training, and will justify scales of pay during later years somewhat lower than when great financial sacrifice had to be made during the years of training.

Dentists

It is more difficult to anticipate the effect of the new service on dental than on medical practitioners; whereas a large portion of the work done by the latter was under National Health Insurance, the dental benefits under N. H. I. were limited.

As in the case of general medical practitioners and specialists, the remuneration of dentists was investigated by a special committee which considered the levels of payment to be aimed at in a general dental service. The committee found that the earnings of most dentists during the prewar year studied (1938) were quite inadequate in relation to the training and professional status of dentists, and insufficient to produce enough recruits to the profession. It therefore recommended that scales of remuneration in the public service be set at levels which would result in substantial increases in most dentists' incomes. (*9*).

The act places no controls on the geographical distribution of dentists, or on the sale of their practices, but it does require prior approval of certain types of work by the Dental Estimates Board. The dental organizations have expressed fears of interference with the clinical freedom of dentists, although they recognize that some controls are necessary to prevent possible abuses by a small minority of the profession.

In the past the patient loads and incomes of most dentists have been limited by the amount of money which people were willing and able to pay for dentistry. The N. H. S. will probably increase the work load of participating dentists to capacity, and in the long run should result in a larger number of dentists. With substantially augmented funds available for dental care, it is expected that recruitment to the profession will be stimulated, and the young dentist entering practice will have reasonable assurance of an adequate income without undue delay.

Administration

Central responsibility for the health service is placed by the act upon the Minister of Health. There are three main branches for administrative purposes, each with quite separate channels: the hospital and specialist services, under part II of the act; the local government health services, under part III; and the general medical, dental, and pharmaceutical services under part IV.

Central Advisory Body

The act sets up, as advisory to the Minister, a central health services council, with 41 members drawn from the medical, dental, nursing, midwifery, and pharmaceutical professions, and from persons with experience in hospital management, mental health services, and local government.[3] The Minister is also empowered to create standing advisory committees to advise him and the council.

Hospital and Specialist Service

Under part II of the act, all voluntary (nonprofit) and public hospitals and their equipment became central government property on the appointed day, but their administration is decentralized. There are 14 regions, each containing a university medical school and following so far as possible natural hospitalization boundaries. The regions differ greatly in geographical area and vary in population from about 1½ to 4½ million.

Regional Hospital Boards—A regional hospital board, appointed by the Minister, administers the hospital and specialist services of each region. The board's primary function is to see that the facilities and services are planned on a regional basis, whereas the day-to-day detailed management of the hospitals is under hospital management committees appointed by the board. For example, the board is responsible for the senior specialist staff, which must be organized on a regional basis if the needs of one hospital are to be balanced against those of another. The local management committees are responsible

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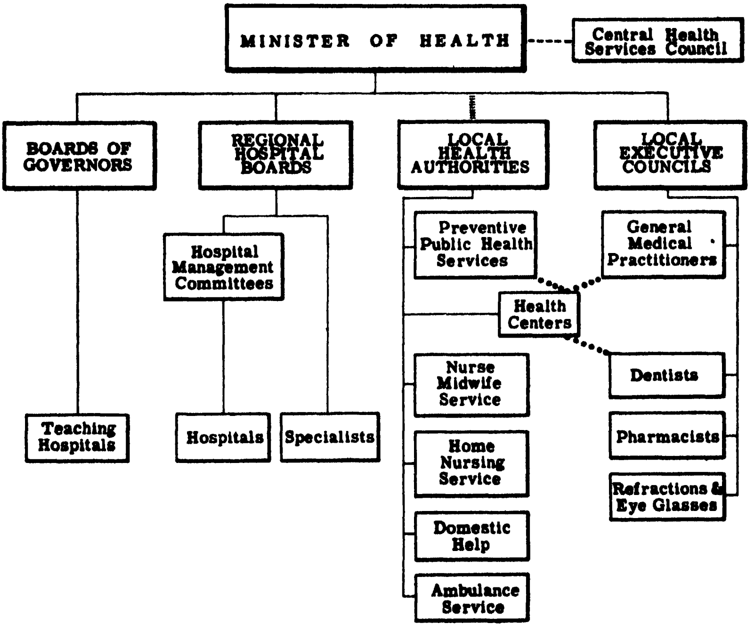
[3] The statutory requirements as to the membership of the council are given in the act, first schedule. The names and positions of the members initially appointed are given in the Brit. Med. J., Aug. 14, 1948 p 350.

ADMINISTRATIVE RELATIONSHIPS
in the National Health Service



NOTE.—This simplified administrative chart does not show all the advisory and administrative committees mentioned in the text. Note that the Central Health Services Council is advisory to the Minister, and that the local health authorities do not stand in the same administrative relationship to the Minister as do the other major administrative bodies. These authorities are administratively autonomous elected local government councils, but their programs for discharging their statutory duties under the act are subject to the approval of the Minister. Health centers are a direct responsibility of the local authorities so far as their construction and maintenance are concerned, but will be functionally closely related to the provision of personal health services, both preventive and therapeutic. It is not feasible to show on the chart the cross representation and overlapping of membership which exist between the various bodies and are intended to help coordinate their respective activities.

for appointment of resident medical staff, nurses, and other employees, for admission procedures, and for housekeeping and maintenance operations.

The regional hospital boards vary in size from 21 to 31 members, plus the chairman. The act required the Minister, before appointing the boards, to consult with the university having the medical school of the region, the medical profession, the voluntary hospitals, the local health authorities, and "such other organizations as appear to the Minister to be concerned." The various organizations were asked to name candidates for board membership, but these candidates might or might not be accepted. The members selected were appointed as individuals of knowledge and experience in the field of hospital work, and not as representatives of the particular bodies which proposed them. Board members serve voluntarily without pay.

As an example, one of the boards is constituted as follows:

It has 30 members in addition to the chairman. Seven members were, when appointed, chairmen or active members of voluntary hospital boards. Seven are chairmen or members of city or county council health committees, and are thus familiar with local public health work and municipal hospital services. Eight members are medical, including two consultant physicians, a surgeon, an obstetrician-gynecologist, a general practitioner, a mental hospital superintendent, a radiologist, and the dean of the medical school. The remaining eight members include a professor of dentistry, two mental hospital committee chairmen, a nursing school instructor, an industrialist, the top official of a county council, the chairman of a county nursing association, and a labor union official. The chairman of the board is a retired local government official with a distinguished record in both local government and voluntary hospital work. Four of the members, including one of the specialists, are women.

The work of the board requires a full-time paid staff. This staff is headed by a medical man and includes as a minimum a regional psychiatrist, one or more assistant medical officers, a secretary (often a man with legal training), a treasurer, and clerical personnel.

The boards appoint their own standing and special committees to study and report on policy problems requiring board action. Special professional advisory committees include specialists who are qualified to give advice on planning the various specialty services in the region and selecting the specialist staff. These advisory committees include many specialists who are not members of the board.

Specialist sta[illegible]—Regulations prescribe the method of appointing specialists, both for new positions and for vacancies. For each appointment, an advisory appointments committee is constituted by the regional board consisting of seven members, of whom at least five must be professional. Two of the professional members must [illegible] professional member, and the university group [illegible]

The vacancy must be advertised in two or more suitable journals and from the applicants the advisory appointments committee selects the candidates considered suitable (if any) and submits their names with appropriate comments, to the board. The board cannot appoint except from the list submitted by the committee, but either the committee or the board may reject all the applicants, and readvertise the position.

This procedure applies to both medical and dental specialist positions, full or part-time, whether clinical or laboratory, in the hospital service. It does not apply to junior staff (i. e., interns and residents) who are appointed by the hospital management committees. Nor did it apply to the initial appointments made on the appointed day when existing hospital staff became officers of the regional boards.

Hospital Management Committees—The hospital management committees are appointed by the boards, after consultation with the local professional and other groups concerned. Their size is variable, being generally between 15 and 20 members. In appointing these committees, the boards have drawn heavily on the membership of the governing bodies of voluntary and public hospitals, but the groups concerned with public health and general practictioner services are represented as well.

Like the boards, each management committee has its paid staff to carry out the detailed work of running its hospital or group of hospitals. This staff is, of course, much the same as the previously existing administrative staff of the same institutions. In some instances the chief officer of the committee is a medical administrator, but medical hospital administrators are less common in England than in the United States.

The number and size of hospitals grouped under the management of each committee vary greatly. The object is to group functionally related units so that they can be administered jointly as a general hospital. For example, two moderate sized general hospitals, a maternity home, a children's hospital, an isolation unit, and a tuberculosis sanatorium located in a single large town might be under one committee. Small general practitioner ("cottage") hospitals are usually included in groups containing larger specialist-staffed general hospitals. Mental hospitals are generally grouped together, or, as is often the case, an individual mental hospital is large enough to justify its own committee. A figure of 1,000 beds has been used as a general guide to groupings, but wide deviations above and below this figure result from geographic and other special situations.

It is intended, by delegation of a high degree of autonomy to management committees, to decentralize effectively the day-to-day administration of the hospital service. An individual hospital may in some instances have its own subcommittees with functions relating to the special characteristics of the particular institution.

Scope of the hospital service—It is to be emphasized that this two-tier administrative structure has responsibility not merely for operating the physical and housekeeping aspects of general and special hospitals, but for providing the whole range of specialist services for ambulatory as well as bed patients. These services include such special items as the regional blood transfusion service, clinical laboratory and pathologic service, provision of hearing aids, artificial limbs, and other appliances, and clinical care (but not epidemiologic control) of tuberculosis and venereal diseases. To the extent that specialist consultations are medically required in patients' homes these must be furnished.

Teaching hospitals—In recognition of the special functions of university medical and dental teaching hospitals, the act places their administration under boards of governors rather than under the regional hospital boards. Each board of governors is responsible for a functionally associated group of hospitals designated by the Minister, after consultation with the university. The boards are appointed by and responsible directly to the Minister. Their membership varies from 20 to 30 persons, of whom one-fifth are nominated by the university, one-fifth by the regional hospital board, and one-fifth by the senior teaching staff. The remainder are appointed by the Minister after consultation with the other bodies concerned. With respect to its group of hospitals the board has the functions of both the regional board and the management committee. It must, of course, work closely with the regional board, since the teaching hospital, in addition to its teaching functions, is an important source of beds for the medical care of patients. The overlapping membership in the two bodies is important in this respect, and both, of course, are responsible to the Minister.

Special provision has been made for the endowments held by teaching hospitals before the appointed day. These funds were transferred to the respective boards of governors, thus remaining with the individual hospitals, in contrast to the provision for nonteaching hospitals whose endowments were transferred to a central pool to be subsequently distributed to the several regional boards and management committees.

The operating costs of the teaching hospitals are borne out of public funds, but the medical schools associated with them retain their separate identity both legally and fiscally. The cost of teaching as such is therefore not charged to the Health Service, although a large portion of it has for many years come out of public funds through government grants to the universities.

Gifts—Regional boards, boards of governors, and management committees are permitted to accept gifts to be used for hospital purposes, including research. Such gifts do not reduce the public funds available to the hospital or group of hospitals but permit activities additional to those provided for in the public budget.

Mental health services—Before the new act, mental health services were almost entirely in the hands of the larger local authorities, which were responsible for operating mental hospitals and institutions for mental defectives, for certification of persons as insane or mentally defective, and for domiciliary supervision of such persons on leave from institutions. With the transfer of the hospitals to the Minister, the administration is divided between the regional boards and the local health authorities.

A very considerable degree of supervision and control over mental hospitals was exercised under the Lunacy and Mental Treatment and the Mental Deficiency Acts by a special agency of the central government known as the Board of Control. Extensive amendments were made in these acts by the National Health Service Act, and most of the functions of the Board of Control were transferred to the Minister of Health. At the national level responsibility for the mental health service now comes under one agency, although the Board of Control remains responsible for matters concerned with "the liberty of the subject," that is, admission and discharge and protection of the rights of persons committed to mental institutions.

Each regional hospital board has a mental health committee, responsible to the board for the discharge of its functions with respect to mental hospitals. At the local level, most mental hospitals have their own management committees. Thus it is quite possible for the traditional separation between mental and general hospitals to continue, although coordination is also possible if the board as a whole is interested in the mental service and if management committees of general and special hospitals have overlapping membership.

Professional care in mental hospitals will be virtually unchanged, since it was largely provided in the past by full- or part-time salaried staff. Regionalization may be expected to result in some economies in the use of highly specialized personnel. Out-patient clinics for psychiatric advice and treatment will be a part of the mental hospital service, although some of these clinics will be located in general hospitals.

The local health authority (see below) will be responsible for determining whether mentally ill or defective persons are in need of institutional care, and for making the initial arrangements for such care; for supervising and training defectives who remain in the community; and for preventive and after-care services for mentally ill and defective persons. Mental hospital patients who are discharged "on trial" under out-patient care, however, remain under the jurisdiction of the hospital.

It is evident that close cooperation between the hospital and the local authority services is essential. The local authority will call on the hospital service for specialist opinions, and the hospitals will depend on the local authority's social workers for knowledge of patients' home conditions. The regional hospital board and the local authority will appoint jointly some of the staff concerned.

Research

The act gives the Minister of Health broad power to conduct or assist any person to conduct research into matters relating to causes, diagnosis, treatment, or prevention of disease. In addition, boards of governors, regional hospital boards, and hospital management committees are authorized to conduct research. These powers supplement those of the Medical Research Council, which for many years has been a coordinating body for research in the medical sciences.

Local Health Authority Services

Part III of the act is concerned with health services provided by local health authorities, that is to say, the councils of counties, and of municipalities having county borough status. There are 145 such units in England and Wales. They have been responsible for certain of the preventive public health services, but many of the sanitary services have been in the hands of the smaller local units of government—the noncounty boroughs and urban and rural districts.

The effect of the act is, in brief, to relieve local health authorities of their hospital duties and to increase their responsibilities in other fields. Some of their new duties are transferred from the authorities of smaller government units, and some were formerly nongovernmental or nonexistent.

The local health authority—The county or county borough council, a locally elected body which is the administrative authority of the local government unit, is referred to in the act as the "local health authority." The authority appoints a health committee to which all health matters are referred. Persons may be co-opted to the health committee, but at least a majority of the members of the committee must be members of the authority—i. e., elected members of the council. Co-option enables the health committee to include technical experts, such as members of the medical or other professions. Although the law does not require co-option of medical members, the Minister has urged local health authorities to do so.

The health officer (the "medical officer of health") and his staff are responsible to the health committee, and through the committee to the local authority. These employees actually carry out the duties of the local health authority.

Duties of the authority—These duties include the following:

1. Maternal and child health activities—prenatal and postnatal care, well-baby and preschool clinics, and priority dental care for expectant and nursing mothers and children under five. Some of these services may be taken over gradually by the patients' family doctors, but the health authority will be responsible for seeing that they are available either in this way or through organized clinics.

2. Home delivery service by trained nurse midwives, backed up by medical aid as required. Obstetrical care by certified midwives has long been accepted practice in England, and provision of such service in the home has been a duty of local health departments since 1936.

3. Health visitor service—the health visitor, a specially trained nurse, is the approximate equivalent of the American public health nurse.

4. Home nursing. This service has been carried out in most areas by voluntary district nursing associations. The act makes it a duty of the health authority to provide home nursing service. Many authorities have arranged with the existing D. N. A. to continue to provide home nursing, the cost now being borne out of public funds.

5. Vaccination against smallpox and immunization against diphtheria. These services have been organized separately in the past: vaccination of infants has been "compulsory" and carried out by "public vaccinators," whereas immunization against diphtheria has been carried out under the auspices of the local health department, on a voluntary basis. The experience in recent years has been that many more babies receive diphtheria prophylaxis under the voluntary program than are reached by the "compulsory" smallpox program, which has many loopholes. Both programs will now be under the same administration and it is anticipated that use of the highly successful techniques of the antidiphtheria campaign will improve the vaccination program.

6. Prevention of illness, care, and after care. The act confers broad powers under this heading, which are intended at present to be exercised chiefly with respect to tuberculosis control, but may be extended widely to other illnesses. Clinical diagnosis and treatment of tuberculosis, whether ambulatory or in sanatoria, is the responsibility of the regional hospital boards. Follow up of contacts, arrangements for special employment, advice from public health nurses, etc., come within the purview of the local health authority. Coordination of these two phases of tuberculosis control will be effected by having

the tuberculosis medical officer jointly appointed by the regional hospital boards and the local health authority.

7. Domestic help may be provided for persons needing it because of illness in the home, and the local health authority may recover charges for this service. The local health authority is permitted but not obliged to set up a domestic help scheme, but all of them have done so. Similar schemes have already been in operation as a part of the maternal and child welfare program.

8. Ambulance service. It is the duty of local health authorities to provide or arrange for ambulance or other transport for persons suffering from illness or mental defectiveness, and for expectant or nursing mothers. In the past, ambulance service has been provided by a variety of public, voluntary, and private agencies. Many municipal authorities have had emergency ambulance services for casualties, and the larger hospitals, both voluntary and municipal, have operated their own ambulances. In many areas, especially the less densely populated areas, ambulances have been run by such voluntary organizations as the St. John Ambulance Brigade and the British Red Cross Society. In many areas these organizations will continue to operate the ambulance service as agents of (and with the costs borne by) the local health authority. Hospitals will keep ambulances only in occasional instances where they are required for transport of patients between units of a large institution. It is to be noted that not only ambulances but cars for transport of "sitting cases" are to be provided. No charge may be made to any person for ambulance service.

9. Health centers. It is the duty of local health authorities to provide, equip, and maintain premises for the provision of general medical and dental services, as well as for any of the local health authority services enumerated above. Except for practitioners furnishing general medical or dental services the local health authority will staff the health center, providing nursing, pharmacist, and ancillary staff, as well as medical and dental personnel furnishing services under part III of the act (e. g., maternal and child health clinics). The health center is intended to form a basis for grouped general practice, closely associated with preventive public health activities. It is to be emphasized that this concept is one of general practice only, quite different from the specialist or mixed specialist and general practitioner groups characteristic of group practice in the United States.

The present restriction on building of nonresidential housing in Britain relegates the health center program to the future, except for a few experimental centers. The administration of these centers will be complicated by the fact that the local health authority will own the building and employ much of the staff, but a major function—general practice—will be carried out by personnel who are responsible to the executive council. It seems probable that a special administrative committee will be set up for day-to-day operation of centers, so that the doctors and dentists will have a proper voice in administration (*9*).

10. Mental health services. The mental health duties of the local health authorities have been described above because of their close relationship to the mental hospital service.

General Medical Services

Some idea of the scope of the general medical services under part IV of the act has been given above. Their administration is patterned closely on National Health Insurance. The chief differences are related to the increased scope of the new service, which now includes dentistry and fitting of glasses, and is available to the whole population instead of to employed persons only.

Executive Council—Local administration is carried out by the executive council, a statutory body set up for each local health authority area. This body has 25 members, of whom 12 are appointed by representatives of the professional groups taking part in the service, 5 are appointed by the Minister, and 8 by the local health authority. Members of the council serve without pay on a voluntary basis, but a paid staff is employed to carry on its routine business.

The executive council contracts with medical and dental practitioners and pharmacists who wish to participate in the service. Public lists are maintained of these practitioners. Each medical practitioner is responsible for the patients who choose and are accepted by him, and the number of such persons is the basis for the major portion of the doctor's pay. The council must therefore keep a current record of the persons on each doctor's list. The doctor notifies the council of deaths, and newborn infants are added to a doctor's list at the request of the parent. Machinery is also set up for keeping track of transfers from one doctor to another both within and outside each council's area. The administrative procedures and records required are greatly simplified by two facts: all persons are eligible for service, and payment to doctors is made on a capitation basis.

The executive council is responsible for periodic reports regarding needs of its area for additional practitioners, and when two or more doctors apply for a single vacancy, may express its views as to which candidate should be selected. The decision on admission of additional practitioners and on filling vacancies is made by a central body, the Medical Practices Committee.

Under the act, doctors are entitled to accept or refuse any patient, but provision is made for patients who cannot find a doctor willing to accept them. The council is empowered to assign such a person to a practitioner, though experience under National Health Insurance suggests that this power will only rarely have to be exercised.

Professional Committees—In addition to the presence of 12 professional members on the council, the professions are strongly represented on various local committees which have advisory or administrative functions. These committees include:

1. Local Medical, Dental, and Pharmaceutical Committees. These committees are formally recognized by the Minister as representative of the respective professions of the area. They are formed by election among the practitioners of the area; their size varies with the size and character of the group represented. They have statutory power to appoint professional members to certain bodies, to consult on certain matters with the executive council, and to investigate some types of complaints.

2. Medical, Dental, and Pharmaceutical Services Committees. Each consists of a chairman and six members, of whom three are appointed by the local medical, dental, or pharmaceutical committees and three by and from the lay members of the council. The chairman is appointed by the six members from the lay members of the council. The appropriate service committee investigates any complaint by a person or by the executive council against a medical or dental practitioner or pharmacist alleging failure to comply with the terms of service.

3. Joint Services Committee. This committee has a similar function in those cases where more than one profession is involved. It consists of a chairman and eight members, two laymen and two from each of the three professions.

4. Local Obstetric Committee. This committee determines which general practitioners may be included in the special list entitled to larger fees for maternity service. It is entirely professional, consisting of the local medical officer of health, a consultant obstetrician appointed by the local medical committee in consultation with the regional hospital board, and two general practitioners appointed by the local medical committee.

5. Ophthalmic Services Committee. This committee administers the supplementary ophthalmic service on behalf of the executive council, as described below.

The doctor's "terms of service"—The practitioner making application to the executive council agrees to be bound by the "terms of service" contained in the regulations. The details of the terms of service were developed after discussion between the Ministry of Health and the British Medical Association, and they follow very closely the corresponding terms which had been developed by experience in National Health Insurance.

The practitioner is responsible for proper and necessary treatment of patients whom he has accepted, or whom he may be called upon to treat in an emergency, provided that the treatment "does not involve the application of special skill or experience of a kind or degree which general practitioners as a class cannot reasonably be expected to possess." If the patient needs treatment of specialist character, the practitioner is expected to advise and assist the patient in obtaining hospital and specialist care.

The practitioner is required to hold regular office hours, to provide proper office accommodation, and to visit patients in their homes when medically necessary. He must supply drugs needed for immediate administration, and prescribe other drugs and appliances to be obtained from a pharmacist. He is required to issue without charge any certificate reasonably required by a patient "for the purpose of any enactment," for example, a disability certificate required for social security benefit. Provision is made for consultation with a medical officer of the Ministry of Health on questions regarding certification.

Records of treatment must be kept on a standard form. A patient's record must be sent on request to the council so that it may be forwarded to the new doctor when the patient changes doctors.

Practitioners must arrange for coverage when off duty. When practicing in partnership, either partner may treat the patient, "if reasonable steps are taken to secure continuity of treatment."

A doctor is prohibited from demanding or accepting any fee for treating patients on his own or his partner's list. Exceptions may be made for service of a specialist character, with the consent of the executive council.

Disputes and discipline—The disciplinary procedures in the general-practitioner service is quite similar to that under N. H. I. Complaints by patients are investigated by the medical services committee, which makes a fact-finding report, together with recommendations for action, to the executive council. The council is empowered to take minor disciplinary action, but in more serious cases can only recommend action to the Minister or the Tribunal. In every case the practitioner has a right of appeal to the Minister. Purely professional questions are referred in the first instance to the local medical committee, an exclusively medical body, which makes recommendations to the council and the Minister as to action.

Three types of disciplinary action may be taken against a practitioner: imposition of a special limit on the size of his list, monetary fines, and removal from the council's list, which prevents his participating in the service. As indicated above, serious fines can be imposed only by the Minister, and only a special body, the Tribunal, can take the most drastic action: removal of the doctor from the service. In these procedures the doctor has the benefit of the local medical representation described above, and in cases considered by the Minister, the latter is advised by a medical advisory committee of six doctors. One of the three members of the Tribunal is medical; its chairman is a lawyer of at least 10 years standing, and the third member is appointed after consultation with the Association of Executive Councils.

Any person can make representations to the tribunal that a practitioner's name should be removed from the list, but investigation by the Tribunal is optional except when the complainant is an executive council. If the Tribunal orders the practitioner's name removed, he may appeal to the Minister, but the complainant has no appeal from a finding by the Tribunal in favor of the practitioner.

The regional medical officers of the Ministry of Health play an important part in forestalling many possible disciplinary actions as they have long done under N. H. I. The chief function of this officer in each locality is to examine patients in consultation on questions of disability certification. He also consults with practitioners regarding prescription costs when records suggest that an individual's costs are substantially higher than average, and may review clinical records in connection with either activity. Under N. H. I., this consultation was sufficient to clear up the difficulty in most cases.

When the trouble persists in spite of his efforts, the regional medical officer may become responsible for initiating formal investigation of a practitioner's prescription costs, record keeping, or certification. But the investigation is primarily in the hands of the local medical committee—the practitioner's professional colleagues. The decision of this committee is subject to appeal by the practitioner or by the Minister, to an independent group of three persons (at least one a medical practitioner) appointed by the Minister. Thus the decision as to whether the practitioner has been professionally at fault is made by the local medical committee (or, on appeal, by the referees), whereas the executive council and the Minister, respectively, recommend and fix the penalty.

Remuneration of general practitioners—The act does not specify the amount or method of payment of doctors, and even the regulations do not give full details. Thus the flexibility necessary to the process of negotiating the details with the profession is permitted. Generally, the basis of payment is very similar to that under N. H. I., but there are notable differences.

A central fund is set up on the basis of 18 shillings[4] per head for 95 percent of the population, on the assumption that about this proportion will eventually use the service. A deduction is made for the mileage fund, and the balance of the fund is distributed to the local executive councils in accordance with a formula which adjusts for persons not yet enrolled on a doctor's list, but who will enroll when they become ill. This formula distributes the fund in proportion to the number of persons actually on doctor's lists plus one-third of those not on lists in each executive council area. Thus a definite amount is allocated quarterly to each executive council, out of which all payments (except mileage) to general practitioners must be made. From this amount deductions are made for payment for emergency treatments, temporary residents, anesthetics, and fixed annual payments, and the balance is distributed among the doctors in proportion to the numbers of persons on the list of each. The actual capitation fee payable to the doctor per person on his list will vary from area to area, depending on the proportion of people enrolled in the area and on the relative amount of noncapitation payments required in the area.

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[4] 1 shilling equals approximately 20 cents at the current pegged exchange rate; £1 equals 20 shillings or $4.03.

Special payments for "mileage" are made from a central mileage fund (deducted from the total 18-shilling pool) which is distributed to rural and semirural council areas on the basis of their geographical characteristics, and to individual doctors in proportion to points scored for patients residing varying distances over two miles from his office. The mileage payment is thus analogous to the capitation fee in that it is fixed in relation to the patients for whom the doctor is responsible and unrelated to the actual number of visits made to distant patients.

The "fixed annual payment" of £300, originally proposed for all practitioners, will now be made only to those applying for it and showing justification for it; e. g., young doctors starting in practice, or elderly doctors able to carry only a small load. Since these payments come out of the local pool, the capitation fee is reduced in an area as the number of fixed payments increases. The doctor receiving the payment has the number of patients on his list reduced by one-seventh in computing his capitation payment. Thus the effect of the fixed payment is to increase the pay of the doctor with a small list, whereas the doctor with a large list would receive more pay without the fixed payment and would not apply for it.

Payment for emergency treatments and anesthesia is made on a fee-for-service basis out of executive council funds, whereas payment for "temporary residents" is a capitation fee adjusted to allow for the fact that persons away from home for periods of under 3 months are unlikely to enroll with a doctor until they actually need treatment.

A special fund is set up centrally (in addition to the central pool) to be used for "inducement payments" for practitioners in areas with insufficient doctors, especially where low population density will make doctors' lists too small to permit adequate income otherwise. This fund will be equivalent to 1 percent of the central pool. Special payments will also be made to selected practitioners who undertake to train assistants.

Maternity service is not included in the capitation fee and extra payments are made for each case for which the doctor accepts professional responsibility, whether or not he is actually called to the confinement by the midwife.

General practitioners are included in the "superannuation," or pension plan, which covers all health service personnel. There is a compulsory deduction of 6 percent of the practitioner's "net" income, to which is added a contribution of 8 percent by the government. From the fund thus created retirement benefits, including widow's pension, are paid. The government contribution in effect adds about 5 percent to the doctor's gross remuneration from public funds.

The Dental Service

The executive council has general responsibility for the dental service in its area. Dentists wishing to participate enter into a contract with the council, in which they agree to abide by the regulations, and the names of these dentists are published for the information of the public. Payment for service is made by the council, but the review of bills is carried out by a separate body, the dental estimates board. In handling complaints and disputes the council plays a role similar to that in the general medical service.

Procedure—The patient wishing to have dental work done may choose any dentist from the list who is willing to accept him as a patient. If he accepts the patient, the dentist examines the mouth, determines what work is required, and agrees with the patient what is to be done. The dentist fills out a chart of the mouth on a special form, noting the proposed work and an estimate of its cost. The dentist may proceed at once with most kinds of treatment, and when the course of treatment is completed, the dentist forwards the form as his claim for payment to the dental estimates board for approval. The board, after reviewing the form, certifies to the council the amount payable to the dentist.

Certain treatments require the approval of the board before the dentist may carry them out. These include extractions requiring the provision of dentures (except in emergency conditions), extensive gum treatments, gold fillings, inlays, crowns, oral surgery, and furnishing dentures and special appliances. Thus the dentist may proceed at once with all ordinary conservative treatment, such as prophylaxis, amalgam or silicate fillings, emergency extractions, X-ray examination, and repair of dentures.

The service is free for all treatment and appliances which are clinically necessary. Patients desiring treatment or appliances more expensive than clinically required (e. g., gold inlay fillings where amalgam would suffice) may pay the extra cost of such treatment. Such cases require the approval of the dental estimates board, and the extra charges may not exceed prescribed limits.

The regulations permit considerable latitude in the size of fees which the Board may approve in cases requiring orthodontia, special appliances, splints, and oral surgery.

Terms of service—The terms to which a dentist agrees when he participates in the service require that he shall "employ a proper degree of skill and attention" and that he shall "provide the treatment necessary to secure dental fitness that the person concerned is willing to undergo."

The dentist is expected to complete treatment "with reasonable expedition." He must not ask for or accept any payment from the patient for treatment rendered under the service. He is required to keep records.

The dentist is required, on reasonable notice, to admit a dental officer of the Ministry of Health to his office to inspect it. The patient is also under obligation to submit to examination by a dental officer if the dental estimates board so requires.

Professional safeguards—It has been noted previously that there are three dentist members of the executive council, appointed by the local dental committee, which represents the dentists of the area. Complaints by patients against a dentist are referred for investigation to the dental services committee; the procedures in investigation of complaints and in fixing penalties are similar to those described above with respect to medical practitioners. There is, in addition to the local dental representation, a dental advisory committee to advise the Minister in appeals cases, and a dentist sits on the Tribunal in cases involving dentists.

Dental Estimates Board— This board's position in the administrative structure has been indicated above; its function is to protect public funds and to prevent deterioration of the quality of service. It is composed of seven dentists, of whom one is chairman, and two laymen. Unlike most of the boards, committees, and councils concerned with the administration of the N. H. S., its members are paid; five of the dentists are full-time, and two dentists and the two laymen are part-time. There will be, in addition, a large staff of clerical workers.

Priority dental service—Recognizing that the shortage of dentists will make it impossible for some persons to obtain needed care, the act requires local health authorities to set up, as part of the maternal and child-health program, an organized dental-care program for expectant and nursing mothers and preschool children; a school dental program is operated by the education authorities. If local health authorities are able to employ sufficient dentists to implement the program, the eligible categories of patients will be able to get complete service without having to find a dentist in the general service. This program is intended to ensure that these groups, for whom dental care is considered especially important, will be able to receive it without undue delay.

Supplementary Ophthalmic Service

The hospital service provides specialist diagnosis and treatment of eye diseases, but since it would be unable to cope with the anticipated demand for sight testing and prescription of eyeglasses, the act provides for a supplementary service for this purpose, administered by the executive councils through their ophthalmic services committees.

Medical practitioners with special ophthalmic experience and ophthalmic opticians (optometrists) examine patients and prescribe eyeglasses, which are furnished by opticians. A patient wishing to have his sight tested must obtain from his general practitioner a recommendation to that effect, but further medical recommendations are not required when the question of reexamination arises. However, if the patient needs repair or replacement of his glasses within 2 years, he must bear the cost himself unless he can prove that the need was not due to carelessness. After 2 years a new examination is required.

Payment for examination and for furnishing eyeglasses is made by the executive council per item of service on the basis of a centrally negotiated fee schedule. The patient has his choice of several types of frames which are fully paid for out of public funds, but he may have certain more expensive frames if he wishes to pay the extra cost himself.

It should be emphasized that this service is intended to be temporary, and the act provides that the Minister may discontinue it in any executive council area when he is satisfied that adequate ophthalmic services are available in the area through the hospital and specialist service.

Cost of the Service

The estimates available of the cost of the National Health Service are for the 9 months between the appointed day and the end of the government fiscal year (March 30). These estimates include items connected with the transitional period so that they are not to be considered as representing nine-twelfths of the normal annual cost.

Estimated Cost of the National Health Service

England and Wales—July 5, 1948, through Mar. 30, 1949

Hospital and specialist services	£107, 197, 000
Local health authority services	7, 500, 000
General medical, dental, pharmaceutical, and eye services	49, 292, 000
Miscellaneous (including compensation, purchase of supplies, etc.)	16, 186, 000
Total	180, 175, 000

The act authorized a total sum of £66,000,000 for compensation of general practitioners for the loss of the right to sell their practices, but only a small portion of this will be payable during the initial period, since it is not paid until the practitioner dies or retires.

Sources of National Health Service Funds

England and Wales—July 5, 1948, through Mar. 30, 1949

Exchequer (general taxation)	£132, 425, 000
Local authorities (local taxation)	3, 750, 000
Transfer from National Insurance contributions	24, 000, 000
Miscellaneous (charges for pay-beds, pension contributions, etc.)	20, 000, 000
Total	180, 175, 000

It will be noted that local taxation meets exactly half the cost of the local health authority services, the other half coming from the Exchequer as matching grants. The use of pension contributions (shown in the last item above) for current financing represents postponement of an Exchequer obligation; when the pension system matures, all contributions to the fund will presumably be needed for paying pensions.

Relation of the Health Service to the Social Security Program

Four acts of Parliament, in addition to the National Health Service Act, came into operation on July 5, 1948: the National Insurance Act, the National Insurance (Industrial Injuries) Act, the National Assistance Act, and the Children Act. The Family Allowances Act had been in effect since August 1946. Together this legislation constitutes a comprehensive social security program.

The National Health Insurance Act, which was repealed by the National Insurance Act, provided both medical benefits and cash disability benefits. Although parts of a single program, the medical benefits were administered through local insurance committees, whereas the cash benefits were handled by the "approved societies"—private nonprofit insurance organizations which were given statutory recognition. Under the new program the National Health Service is independent of the cash benefit insurance program, and eligibility for health services is universal. and not related to insurance status.

The National Insurance Act requires contributions from everyone between the ages of 16 and 65 (men) or 60 (women), whether employed or not, except married women not employed outside the home. Employers make a nearly equal contribution for each employee. The Industrial Injuries Act, which supplants the Workmen's Compensation Acts, requires additional contributions by both employee and employer, and the combined amounts are collected together as pay-roll deductions. The Ministry of National Insurance administers the cash benefits of both programs, which include sickness, maternity, and industrial injury benefits, unemployment benefit, widow's benefit, retirement pension, and other special grants and allowances. Some of the "friendly societies," which long antedated National Health Insurance as voluntary insurance societies, and became "approved societies" under that program, may continue to offer voluntary insurance to supplement the cash benefits of the new governmental program. The National Insurance Act provided, however, for absorption of the personnel of these societies into the central and local offices of the Ministry of National Insurance.

The cash benefit programs assume that all necessary medical and rehabilitation services (including those for industrial injuries) will be available to everyone through the N. H. S., and they depend on the professional personnel working in the N. H. S. to furnish the certificates of sickness and disability necessary for the administration of the benefits. It is perhaps worth noting in this connection that much of the "paper work" with which general practitioners in England are burdened is related to the cash insurance program (and rationing and commodity controls) and is not an intrinsic part of the health service.

About one-tenth of the insurance contributions is transferred from the National Insurance fund to the health service, and will amount to approximately 13 percent of the cost of the latter.

The Family Allowance Act provides weekly cash allowances to families for each child except the first, thus helping large families to compensate for the flat rates of contributions and benefits in National Insurance.

The National Assistance Act provides cash assistance to persons not able to meet minimum living expenses from their own resources including insurance benefits, and puts upon local authorities the duty of providing living accommodation for aged and infirm persons. The health service, of course, takes care of the medical needs of assistance recipients at no cost to the assistance authorities. In the case of certain persons needing institutional care, a shadowy line divides those who are chronically ill, and are cared for by the hospital service, from those who are merely infirm, and are the responsibility of the local authority. The latter group includes those who do not require continuous medical and nursing supervision, and such occasional medical attention as they may need is furnished under the general medical service. A given individual may, of course, shift from one group to the other.

Under the Children Act, local authorities are made responsible for care of orphans and children who are lost, deserted, or in certain other categories, by placement with foster parents or in an institution. Voluntary homes and institutions for the care of such children must register and must meet minimum standards.

Conclusion

The National Health Service represents the culmination of a long period of development of organized health and medical services in Britain. Its basic principle, that health services, like education, should be available to all as a public responsibility, had become essentially noncontroversial in Britain before the act was passed. Its administrative structure was conditioned by the long-standing framework of public health administration, the 35 years of experience in furnishing a general practitioner service under National Health Insurance, and the British tradition of administration by voluntary boards and committees. Its details have necessarily had to fit into the framework of broad public policy determined by the government and Parliament in power at the time of its inception but, within this framework, have been developed in consultation and negotiation with the professional groups concerned.

The Health Service must be viewed as a part of the comprehensive system of social security which came into operation on the same appointed day. It is, in fact, the most comprehensive part of that system, since its coverage is universal, offering health services to persons reached by any, or by none, of the income maintenance programs.

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Report on Recent Outbreaks of Influenza

World Health Organization Influenza Information Center

Reports on a number of outbreaks of influenza as well as on the isolation of strains of influenza virus have been received by the Influenza Information Center at the National Institutes of Health, which administers the World Health Organization influenza study program in the United States under the joint sponsorship of the Army, Navy, Air Force, and Public Health Service. Although no serious epidemic of influenza has appeared within the United States during the present winter, the virus of influenza has been recovered from sporadic cases of the infection in several localities. On the other hand, rather extensive although mild epidemics of influenza have been reported from several places outside continental United States. Brief notations on reports recently received by the Information Center follow.

Within Continental United States

December 4, 1948. The isolation of three strains of influenza virus was reported from sporadic cases in the Pittsburgh area. All of the strains were identified as of the "A–prime" group. One strain was closely related antigenically to the FM–1 virus. In addition, one case of type "A" infection has been identified serologically in the Pittsburgh area.

December 30, 1948. Two sporadic cases of influenza "B" were reported among troops at Fort Sill, Okla. The infections were mild, and lasted only two days. The diagnoses were established by serological tests.

January 14, 1949. A report was received of four cases of influenza, diagnosed as of type "B", occurring during December 1948, among troops at Fort Ord, Calif.

January 17, 1949. An outbreak of influenza, of undetermined size, was reported in Seattle. Two strains of influenza virus, believed to be of type "B", had been isolated.

Outside Continental United States

Alaska. January 3, 1949, a small outbreak of upper respiratory disease, suspected to be influenza, was reported among troops at Big Delta, Alaska. The identity of the infecting agent was not at once determined. Acute and convalescent serums were to be shipped by air from the affected area in Alaska to the Sixth Army Area Medical Laboratory at Fort Baker, Calif.

Puerto Rico. November 17, 1948, the isolation of an influenza virus was reported from patients with respiratory disease in Coamo, Puerto Rico. The Coamo strain of virus was subsequently identified to be of the "A-prime" group.

Venezuela. December 8, 1948, the Information Center was advised of a recent epidemic of influenza in Venezuela, reported to be caused by a type "B" virus.

Italy. December 22, 1948, the Information Center received a report of an outbreak of an estimated 500,000 cases of mild influenza in central, southern, and insular Italy. The virus responsible for at least part of the cases was believed to be type "B." The epidemic was said to be past its peak by the date of report. No cases were known among among American troops in northern Italy.

France. January 12, 1949, French authorities advised of an outbreak of mild influenza affecting approximately 20 percent of the population of France. The virus tests indicated that approximately half the cases were caused by the type "A" strain.

Holland. January 14, 1949, the Information Center was advised of an epidemic of type "A" influenza in southern, but not in northern Holland.

Other European Countries. No abnormal rise in the incidence of influenza has been reported from Scandinavia, Germany, Poland, Bulgaria, Albania, Greece, Portugal, Spain, or the British Isles including Ireland. An outbreak in the Austrian Tyrol was reported January 11, 1949. On January 14, 1949, thirteen cantons of Switzerland were said to be suffering an epidemic of the disease.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 22, 1949

A slight net seasonal increase was reported in the incidence of measles. A total of 13,392 cases was reported currently, as compared with 11,609 last week and a 5-year (1944–48) median of 5,490. An aggregate of 6,985 cases was reported in the New England, Middle Atlantic, and West South Central areas. States reporting the largest numbers are as follows (last week's figures in parentheses): Texas 2,005 (1,585), Massachusetts 1,373 (1,435), Pennsylvania 1,060 (689), New York 839 (1,005), Maryland 724 (537), California 685 (584), Oregon 550 (501), Wisconsin 511 (426). The total for the first 3 weeks of the year is 36,342, as compared with a 5-year median of 13,573 and 34,448, the largest corresponding figure of the past 5 years, reported in 1944.

A total of 4,585 cases of influenza was reported for the week, as compared with 11,687 for the corresponding week last year, which latter number was also the 5-year median. An aggregate of 3,820 cases, more than 80 percent of the total, was reported in 4 States (Texas, South Carolina, Virginia, and Arkansas), where 7,780 cases (66 percent of the total) were reported for the corresponding week last year. The total to date this year is 12,807, as compared with a 5-year median of 32,382, reported for the same period last year.

Of the total of 113 cases of poliomyelitis reported currently (last week 143, 5-year median 47), California reported 40 (last week 62), New Jersey 8, Texas 7, Michigan and Minnesota 6 each, and Florida and Washington 5 each.

Four cases of Rocky Mountain spotted fever were reported currently, 3 in North Carolina and 1 in Georgia. One case of psittacosis was reported for the current week, in Alabama, and a delayed report was received of the occurrence in October of a laboratory case of that disease in Illinois.

Deaths, all causes, recorded during the week in 94 large cities in the United States totaled 9,910, as compared with 9,896 last week, 10,305 and 10,012, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 10,181. The total for the first 3 weeks of the year is 30,596, as compared with 31,882 for the same period last year. Infant deaths for the week totaled 685, as compared with 716 last week and a 3-year median of 722. The total to date is 2,110, as compared with 2,233 for the same period last year.

Telegraphic case reports from State health officers for week ended January 22, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	4	----------	----------	272	----------	10	----------	----------	9	----------	----------	----------	4	----------
New Hampshire	----------	----------	2	25	----------	----------	----------	----------	2	----------	----------	----------	----------	----------
Vermont	----------	----------	----------	402	1	----------	1	----------	10	----------	----------	----------	34	----------
Massachusetts	6	1	----------	1,373	1	----------	----------	----------	230	----------	1	1	74	----------
Rhode Island	----------	----------	----------	159	----------	4	----------	----------	11	----------	----------	----------	14	----------
Connecticut	----------	----------	1	236	1	47	----------	----------	44	----------	----------	----------	6	----------
MIDDLE ATLANTIC														
New York	4	----------	[b] 1	839	8	358	----------	----------	[c] 240	----------	----------	3	163	5
New Jersey	1	----------	4	328	2	107	8	----------	124	----------	----------	----------	78	3
Pennsylvania	9	----------	(b)	1,060	9	----------	----------	----------	197	----------	----------	5	70	----------
EAST NORTH CENTRAL														
Ohio	10	----------	1	51	1	39	----------	----------	326	----------	----------	3	34	13
Indiana	9	2	13	34	1	15	----------	----------	49	----------	----------	----------	16	33
Illinois	5	2	4	40	5	99	----------	----------	196	----------	3	----------	37	4
Michigan [a]	13	----------	3	391	2	49	6	----------	303	----------	----------	1	37	2
Wisconsin	3	----------	47	511	----------	9	----------	----------	77	----------	1	----------	20	----------
WEST NORTH CENTRAL														
Minnesota	4	----------	----------	26	1	13	6	----------	95	----------	----------	----------	3	----------
Iowa	----------	----------	----------	16	----------	1	2	----------	56	----------	1	----------	2	3
Missouri	5	----------	3	380	1	34	3	----------	52	----------	----------	2	6	----------
North Dakota	1	----------	----------	170	----------	----------	1	----------	12	----------	----------	----------	6	(1)
South Dakota	----------	----------	----------	8	----------	----------	3	----------	6	----------	----------	----------	----------	----------
Nebraska	1	----------	10	17	----------	14	3	----------	27	----------	----------	----------	8	----------
Kansas	5	----------	4	17	3	32	4	----------	50	----------	----------	----------	8	----------
SOUTH ATLANTIC														
Delaware	----------	----------	----------	18	1	----------	----------	----------	7	----------	----------	----------	----------	----------
Maryland [a]	2	----------	4	724	----------	71	----------	----------	[c] 37	----------	----------	----------	16	----------
District of Columbia	1	----------	----------	39	1	15	1	----------	7	----------	----------	----------	4	----------
Virginia	1	----------	440	455	3	97	2	----------	14	----------	----------	1	22	2
West Virginia	2	----------	54	156	2	20	----------	----------	14	----------	----------	2	10	----------
North Carolina	9	----------	----------	162	2	----------	2	3	18	----------	2	3	16	----------
South Carolina	14	1	601	39	1	179	1	----------	7	----------	1	1	26	5
Georgia	5	----------	21	86	6	72	----------	1	46	----------	5	1	----------	7
Florida	15	----------	4	53	1	20	5	----------	9	----------	----------	1	13	2

Reports from State health officers—Continued

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	5	--------	6	97	3	38	--------	--------	34	--------	1	5	17	10
Tennessee	5	1	106	136	8	97	1	--------	75	--------	7	2	20	--------
Alabama	11	--------	66	250	--------	39	2	--------	26	--------	--------	1	7	5
Mississippi	8	--------	24	22	6	43	1	--------	5	--------	1	2	6	--------
WEST SOUTH CENTRAL														
Arkansas	2	--------	221	155	--------	105	2	--------	9	--------	--------	--------	15	1
Louisiana	2	--------	17	45	2	38	1	--------	6	--------	2	3	1	--------
Oklahoma	11	--------	98	86	6	50	--------	--------	14	--------	1	2	3	5
Texas	30	--------	2,558	2,005	16	376	7	--------	34	--------	2	3	97	30
MOUNTAIN														
Montana	3	--------	11	33	--------	--------	1	--------	15	--------	--------	--------	4	--------
Idaho	4	--------	16	54	--------	14	--------	--------	[c] 23	--------	--------	--------	2	--------
Wyoming	--------	--------	--------	8	--------	3	--------	--------	2	--------	1	--------	--------	--------
Colorado	3	--------	38	182	1	37	--------	--------	12	--------	--------	--------	15	--------
New Mexico	2	--------	4	130	--------	8	--------	--------	29	--------	--------	--------	3	--------
Arizona	1	--------	147	210	--------	28	--------	--------	6	--------	--------	1	8	1
Utah [a]	9	--------	4	105	--------	4	2	--------	7	--------	--------	--------	7	--------
Nevada	--------	--------	--------	1	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------
PACIFIC														
Washington	1	--------	10	397	--------	4	5	--------	42	--------	--------	--------	7	--------
Oregon	--------	--------	10	550	--------	33	3	--------	24	--------	--------	1	19	--------
California	19	--------	32	685	5	40	40	--------	120	--------	--------	1	59	7
Total	245	7	4,585	13,392	100	2,262	113	4	2,758	--------	29	45	1,017	--------
Median, 1944-48	282	8	11,687	5,490	222	--------	47	--------	2,711	9	35	48	2,418	--------
Year to date 3 weeks	585	23	12,807	36,342	264	6,306	399	5	7,253	1	119	110	3,001	--------
Median, 1944-48	988	20	32,382	13,573	693	--------	128	1	7,816	22	87	129	6,526	--------
Seasonal low week ends (1948)	(27th) July 10	--------	(30th) July 31	(35th) Sept. 4	(37th) Sept. 18	--------	(11th) Mar. 20	--------	(32d) Aug. 14	(35th) Sept. 4	--------	(11th) Mar. 20	(39th) Oct. 2	--------
Since seasonal low week	5,699	--------	49,077	88,735	1,108	--------	27,726	--------	29,951	16	--------	3,229	13,034	--------
Median 1943-48	8,554	--------	75,940	39,697	2,197	--------	13,499	--------	46,387	98	--------	4,380	31,532	--------

[a] Period ended earlier than Saturday.
[b] New York City and Philadelphia only, respectively.
[c] Including cases reported as streptococcal infection and septic sore throat.
[d] Including paratyphoid fever, reported separately, as follows: New York 1; Georgia 1; Louisiana 1; Texas 1. Salmonella infections, not included, were reported as follows: New York 2.

Psittacosis: Alabama, 1 case; delayed report, 1 case, Oak Park, Ill., onset Oct. 16, 1948. Patient reported to have handled virus in Illinois State Health Department laboratory, Chicago.

Alaska: Scarlet fever 1; whooping cough 1.

Territory of Hawaii: Influenza 1; measles 401; lobar pneumonia 1; add to last week, measles 9.

[1] Correction: Rabies in animals, week ended Jan. 8, North Dakota, no cases (instead of 9).

DEATHS DURING WEEK ENDED JANUARY 15, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Jan. 15, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9, 896	10, 200
Median for 3 prior years	10, 200	
Total deaths, first 2 weeks of year	20, 686	21, 577
Deaths under 1 year of age	716	
Median for 3 prior years	673	
Deaths under 1 year of age, first 2 weeks of year	1, 425	1, 506
Data from industrial insurance companies:		
Policies in force	70, 630, 370	66, 858, 967
Number of death claims	12, 811	14, 551
Death claims per 1,000 policies in force, annual rate	9. 5	11. 4
Death claims per 1,000 policies, first 2 weeks of year, annual rate	9. 2	11. 2

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—5 weeks ended December 31, 1948.—During the 5 weeks ended December 31, 1948, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	7	Syphilis	259
Diphtheria	48	Tetanus	8
Dysentery	1	Tetanus, infantile	4
Gonorrhea	214	Tuberculosis (all forms)	690
Influenza	122	Typhoid fever	42
Malaria	115	Whooping cough	139
Measles	129		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 1, 1949.—During the week ended January 1, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		39		127	608	69	100	104	158	1,205
Diphtheria			1	3	7	1	3	2		17
German measles		2		13	9		3	3	8	38
Influenza		48			4					52
Measles		33	9	82	171	111	26	74	112	618
Meningitis, meningococcal		1		2	5				1	9
Mumps		13	1	18	347	31	15	12	38	475
Poliomyelitis		1					1	2	1	5
Scarlet fever		10	1	72	85	3	6	10	15	202
Tuberculosis (all forms)		3	7	47	39	13	11	49	23	192
Typhoid and paratyphoid fever				2						2
Undulant fever								1	1	2
Venereal diseases:										
Gonorrhea		8	10	38	47	22	11	27	60	223
Syphilis		5	13	70	30	13	3	3	11	148
Whooping cough		1		48	23	1	3	1		77

JAMAICA

Notifiable diseases—5 weeks ended December 31, 1948.—During the 5 weeks ended December 31, 1948, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis		1	Erysipelas		1
Chickenpox	8	9	Tuberculosis (pulmonary)	35	52
Diphtheria	1	2	Typhoid fever	13	89
Dysentery, unspecified	4	1	Typhus fever (murine)	1	1

NETHERLANDS

Amsterdam—Psittacosis.—During the week ended December 4, 1948, 1 case of psittacosis was reported in Amsterdam, Netherlands.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—Cholera has been reported in Calcutta, India, as follows: Week ended January 8, 1949, 94 cases, 22 deaths; week ended January 15, 156 cases, 43 deaths. Due to the sharp increase in the number of deaths in the metropolitan area, cholera was declared epidemic on January 18, 1949.

Pakistan—Chittagong.—Cholera has been reported in recent weeks in Chittagong, Pakistan, as follows: Week ended January 8, 1949, 10 cases with 4 deaths; week ended January 15, 14 cases with 13 deaths.

Plague

Belgian Congo.—The following reports of plague in the Belgian Congo have been received: Costermansville Province, week ended January 1, 1949, 1 fatal case (pneumonic); Stanleyville Province, week ended December 25, 1948, 1 fatal case; week ended January 1, 1949, 1 fatal case.

India—Calcutta.—During the week ended January 15, 1949, 1 case of plague was reported in Calcutta, India.

Madagascar.—During the period December 11–31, 1948, 17 cases of plague with 16 deaths were reported in Madagascar.

Netherlands Indies—Java—Surabaya.—During the week ended November 27, 1948, 2 cases of plague were reported in Surabaya, Java, and 8 deaths from plague were reported during the same week.

Union of South Africa.—Plague has been reported in Union of South Africa as follows: In Cape Province during the week ended December 18, 1948, 6 cases, 2 deaths; in Orange Free State, week ended December 11, 1948, 1 case, 1 death; week ended December 25, 1 suspected case.

Smallpox

India—Ahmedabad.—During the week ended December 25, 1948, 27 cases of smallpox with 22 deaths were reported in Ahmedabad, India.

Indochina (French).—Smallpox has been reported in French Indochina as follows: Week ended December 25, 1948, 33 cases, 10 deaths; week ended December 31, 37 cases, 6 deaths.

Ivory Coast.—During the period December 21–31, 1948, 21 cases of smallpox with 2 deaths were reported in Ivory Coast.

Iran—Khoramshahr.—During the week ended December 25, 1948, 8 cases of smallpox were reported in the port of Khoramshahr, Iran.

Lebanon.—Smallpox has been reported in Lebanon as follows: Week ended December 18, 1948, 26 cases, including 2 cases in Beirut; week ended December 25, 34 cases, 1 of which was reported from Beirut; week ended December 31, 37 cases.

Netherlands Indies—Java—Batavia.—During the period January 10–17, 1949, 66 cases of smallpox were reported in Batavia, Java. The disease was stated to have been declared epidemic there, and vaccination of all residents of the city was begun.

Philippine Islands.—Smallpox has been reported in the Philippine Islands as follows: On Mindoro Island, week ended November 27, 1948, 64 cases, 7 deaths; week ended December 4, 15 cases, 4 deaths. Also 1 fatal case was reported in Baguio City on Luzon Island during the week ended December 4.

Turkey.—During the period November 1–30, 1948, 24 cases of smallpox with 3 deaths were reported in Turkey, and during the week ended January 15, 1949, 9 cases were reported from Maras Province, Turkey.

Typhus Fever

Germany—United States Zone.—During the week ended December 11, 1948, 4 cases of typhus fever (murine) were reported in the Bremen area of the United States Zone of Germany.

Guatemala.—During the period September 1–30, 1948, 39 cases of typhus fever with 15 deaths were reported in Guatemala. Of these, 2 cases were stated to have occurred in Guatemala City.

India—Bombay.—During the week ended December 25, 1948, 1 case of typhus fever was reported in Bombay, India.

Sierra Leone.—During the week ended November 6, 1948, 9 cases of typhus fever (murine) were reported in Sierra Leone, 8 of which were stated to have occurred in Freetown.

Yellow Fever

Belgian Congo—Stanleyville Province.—On January 1, 1949, 2 fatal cases of yellow fever were reported in the region of Paulis, Stanleyville Province, Belgian Congo.

Panama—According to information received January 20, 1949, no new cases of jungle yellow fever have been reported in Panama. (See Public Health Reports for February 4, 1949, p. 158).

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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A Transparent Dextrose Serum Tellurite Plating Medium

Its Use as an Adjunct to Microscopic Examination of Smears Made From Loeffler Slants in Routine Diphtheria Diagnosis

By ONA R. WHITLEY, M. S., and SAMUEL R. DAMON, Ph. D.*

The purpose of this study was to develop a plating medium on which *C. diphtheriae* would exhibit differential colonial features. With such a medium, recognition of these characteristics could be used in the diagnostic laboratory to supplement the study of cellular morphology in smears made from Loeffler slants. Diagnostic reporting should thus become more objective and more reliable.

The usefulness of such a medium would depend on whether or not diphtheria colonies would be large enough to show their characteristics after 18–24 hours incubation, that is, at the time diagnostic smears are usually made. Furthermore this plating medium should be inhibitory for as many as possible of the commensal organisms found in nose and throat cultures.

Review of Literature

The classical and most widely used diagnostic medium for the cultivation of *C. diphtheriae* for more than 50 years has been Loeffler's coagulated blood serum. Advantages claimed for it have been that it was highly favorable for the growth of the diphtheria bacillus and that the typical morphology and arrangement of the organism was best brought out on this medium. Such may have seemed to be true to those who used it without making comparative studies, but in the hands of a critical worker it has clearly left much to be desired.

Commenting on the diagnostic utility of Loeffler, Cooper (1) and his associates wrote "those bacteriologists who continue to depend entirely on Loeffler medium are doing second-rate bacteriological work as far as diphtheria is concerned." And with reference to growth and cellular morphology when cultivated on this medium, Mueller and Miller (*2*) said "the normal, well-rounded diphtheria bacillus probably never has been observed from Loeffler medium because the latter provides only a starvation diet. The rapidity and selectivity of its supposed growth-promoting properties are illusory."

---

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Other disadvantages to the use of Loeffler derive from the fact that being entirely nonrestrictive a great variety of commensal organisms grow on this medium when it is inoculated with nose and throat swabs and any small number of diphtheria bacilli present may be obscured by being overgrown. Loeffler may also be rendered quite useless due to its digestion by spore-forming or other proteolytic organisms in the inoculum, or it may not support growth of some strains of *C. diphtheriae*. Further, such variations occur in its composition from lot to lot, and the morphology of diphtheria bacilli is so affected by these differences, as shown by Goldsworthy and Wilson (*3*), that the organisms are at times quite unrecognizable. Finally, the identification of *C. diphtheriae* from Loeffler rests solely on the ability of the examiner to recognize accurately under the microscope a wide range of morphological variants.

Because of these drawbacks a variety of media—most of which contained one or another of the salts of tellurous acid—have more recently been proposed as substitutes for Loeffler or as complementary to it.

Without going into details of composition or the specific advantages claimed for the various formulae, the following summary indicates why they have been advocated:

1. They have been less inhibitory for all types of *C. diphtheriae*.
2. They yielded more positives than did other media.
3. They inhibited more commensal organisms.
4. They were not digested by proteolytic organisms.
5. They brought out differential colonial characteristics of diphtheria and diphthomorphic organisms.

The disadvantages of these media have been, mainly, that if they significantly restricted commensal organisms, especially diphtheroids, they also inhibited *C. diphtheriae*, or the cellular morphology of *C. diphtheriae* was so altered as to make microscopic recognition of the organism very difficult.

The Ideal Medium

Categorically stated, the ideal medium should possess the following characteristics for use in culturing naso-pharyngeal swabs for diagnostic purposes, for use as a plating medium, or for isolation of pure cultures of *C. diphtheriae:*

1. It should be noninhibitory for all types of *C. diphtheriae.*
2. It should have no material effect on the characteristic cellular morphology of the organisms.
3. It should give good growth on Petri plates of all strains of *C. diphtheriae* at 18–24 hours incubation.
4. Translucency of the medium is highly desirable if it is to be used for plating purposes, as this facilitates differentiation of colonies.
5. Colonial differentiation of all strains of *C. diphtheriae* from other organisms growing on the medium should be easy, or, alternatively, selectivity of the medium should be such as to inhibit growth of all organisms except *C. diphtheriae.*
6. It should inhibit commensal organisms as much as possible.
7. The ingredients should be easily obtainable and stable when stored for any length of time.
8. Preparation of the medium should be easy and quick—not calling for repeated filtrations or tedious adjustments of reaction.
9. On storage the prepared medium should be stable.
10. Large or small quantities of the medium should be prepared with equal ease.

Introduction of Tellurite Media

Following the introduction of tellurite salts as a component part of selective media for isolation of *C. diphtheriae,* many different formulae were proposed and some of them have been quite widely used. Initially, these media were considered as especially valuable for isolation and typing purposes as suggested by Douglas (*4*), Anderson, Happold, McLeod, and Thompson (*5*), and Horgan and Marshall (*6*), and many others. For routine diagnostic purposes, however, Loeffler slants continued to be used for the most part though the greater accuracy of tellurite media in the detection of *C. diphtheriae* was reported by Sutherland and Iredale (*7*), Wilson (*8*), Anderson (*9*), Knox (*10*), Frobisher (*11*), Perry and Petran (*12*), and Kellogg and Wende (*13*). Others, as for example Wright (*14*), employed tellurite as a means of eliminating false positive diagnoses due to the presence of diphtheroids and false negatives due to overgrowth of *C. diphtheriae* by commensal organisms; Young (*15*) used it because it was more productive; Cruickshank (*16*) found it to be not only more productive but to yield a considerably higher percentage of confirmed diagnostic cultures; Knox (*10*) reported it gave nearly twice as many positives as Loeffler in the examination of convalescents and contacts, and

Frobisher (*11*) detected three times as many carriers by plating negative and doubtful Loeffler cultures onto tellurite.

Reviewing the literature, then, on the use of tellurite media, it thus appears that they have been used by different workers in different ways and for different purposes.

Experimental Procedures

As a preliminary step comparative studies of many of the more recently suggested media were undertaken with particular attention being paid to the following points:

1. Was the medium inhibitory for any type of *C. diphtheriae*.
2. Was the medium inhibitory for any of the commensal organisms commonly encountered in nose and throat cultures.
3. Did the medium support sufficiently active growth of *C. diphtheriae* so that colonies coming up on the plates in 18–24 hours were large enough to show differential features.
4. Did the color of the medium allow easy recognition of differential colonial characters.
5. Were any special difficulties encountered in the preparation of the medium.
6. Was the prepared medium stable.

No attempt will be made to catalog the observations recorded on all media tested. Certain generalizations, however, may be made:

1. The media containing fresh blood or blood and cystine, such as those of Clauberg, and Frobisher, in general support good growth of diphtheria bacilli, although they may inhibit some strains of the small-colony variety.

The colonies, however, on these media after 18–24 hours incubation do not exhibit differential features and are therefore of no confirmatory value at the time diagnostic smear examinations from Loeffler are usually being made. Further disadvantages of these media are that while they may or may not inhibit commensal organisms they are not usable for any extended time after preparation.

2. The media containing heated blood, such as the chocolate-tellurite agar of Anderson, do permit differentiation of the gravis and mitis types but they also inhibit certain diphtheria strains. Of equal importance is the fact that colonies are too small at the critical period to be recognized with assurance.

More recently a heated hemoglobin tellurite agar has been proposed by Galbraith, Bramhall and Fraser which is said not to be inhibitory for any type of diphtheria. It is also claimed to bring out differential colonial characteristics. Our experience, however, has been that at 18–24 hours this medium was highly inhibitory for small-colony strains and did not bring out any differential colonial features whatever.

3. Those media such as that of Mueller, markedly restricting growth of commensal organisms, are also inhibitory for certain types of *C. diphtheriae*, give colonies having no differential features, and do not promote rapid enough growth to be helpful in 18–24 hours after inoculation.

Formula of Dextrose Serum Tellurite Agar

The ingredients needed for the preparation of this medium are available in any diagnostic laboratory.

Preparation of the medium from the basic components as it is needed each day is entirely possible, but it will be more convenient to keep poured plates on hand, ready for immediate use. In lieu of this, sterilized basic agar and sterile dextrose serum tellurite solution, ready to be added to the melted basic agar, may be kept in stock and the number of plates needed may be poured immediately prior to their use.

The directions which follow are for the preparation of 100 cc. of the completed medium. The amounts of the various components to be used in making up larger quantities may be determined by simple multiplication.

To prepare 100 cc. of the medium

Weigh 4.5 grams of Difco proteose No. 3 agar.
Weigh 0.5 gram of Difco Bacto-agar (granular).
Dissolve the above in the Arnold sterilizer in 100 cc. of buffered distilled water pH 7.1–7.2.*
Sterilize in autoclave at 121° C. for 15 minutes.
Cool to 50° C. in a water bath. This is important.
Aseptically add 8.0 cc. of stock dextrose serum tellurite solution.**
Mix thoroughly.
Pour plates aseptically and not less than 5 mm. thick.
Incubate at 37° C. to test sterility.
Store plates in cold room; they are good for at least a month.

**Preparation of Buffered Distilled Water*

a. M/15 anhydrous disodium phosphate (Na_2HPO_4). Divide molecular weight given on the bottle by 15 and dissolve this amount of the salt in 1,000 cc. of distilled water.

b. M/15 anhydrous sodium acid phosphate (NaH_2PO_4). Divide molecular weight given on the bottle by 15 and dissolve this amount of the salt in 1,000 cc. distilled water.

c. To prepare 1,000 cc. buffered distilled water of pH 7.2 add 72.0 cc. of (a) above and 28.0 cc. of (b) above to 900 cc. of distilled water.

***Preparation of Stock Dextrose Serum Tellurite Solution*

The following sterile components are combined aseptically to give the working solution. Human serum is specified, as it is easily obtainable from the serologic laboratory, but beef or other serum may be substituted although our results with these have not been as good as with human serum. Either crystalline potassium tellurite or the powdered salt is satisfactory and is used in 0.5 percent concentration.

Human serum	30.0 cc.
Dextrose solution (20%)	12.0 cc.
Potassium tellurite solution (0.5%)	6.0 cc.

Note: For preparation of the above.

1. Human (Wassermann) serum is pooled and sterilized by Seitz filtration.
2. Dextrose solution (20% in distilled water) is sterilized by Seitz filtration.
3. Potassium tellurite solution (0.5%) is prepared as follows: Grind 0.5 gm. of C. P. dry crystalline potassium tellurite very fine in a small dry mortar. Add 10.0 cc. buffered distilled water gradually after grinding. Stir well and allow to settle. Remove clear supernatant by pipette to a 100 cc. graduate. Add more buffered water and stir. Allow to settle and remove supernatant to the graduate. Repeat until all the tellurite appears to be dissolved. Finally, add a few drops of 10% KOH to the mortar. Rinse the sides of the mortar with 10.0 cc buffered distilled water and add this to the graduate. Make up the volume to 100.0 cc. Seitz filter. The final pH will be about 9.6.

Caution: Keep the crystalline potassium tellurite in a dessicator.

Colonial Morphology

Since the beginning of this study it has been observed that colonial size and appearance on different media vary much more than had been realized. However, because of uniformity of composition of the medium the colonial characteristics of *C. diphtheriae* on dextrose serum tellurite agar are remarkably constant although there are inherent differences between the various types, i. e., intermedius, mitis, gravis, and small-colony variety.

To facilitate recognition and differentiation of colonies of *C. diphtheriae* and other organisms coming up on the plates, the following descriptions may be found helpful. In a diagnostic laboratory the most significant characteristics are those observed at the end of 18–24 hours incubation because it is at that time that parallel smear preparations from Loeffler are generally examined.

In all instances colony examination is best made using a hand lens of about 8x magnification but a colony microscope is an advantage in the study of colonial detail.

Intermedius colony type

24 hours—very small gray colony, 0.25–0.5 mm (av. 0.3 mm); very slightly raised, but sometimes flat with tiny black dot, or dark gray center. Edge is serrated or entire, and surface somewhat matt-like in some strains: uniform in size.

Mitis-like colony type

24 hours—variation in colony size common, 0.3–1.25 mm (av. 1.0 mm); gray, sometimes a dull gray with darker gray center, smooth, round, convex, and glistening. Entire edge; butyrous consistency.

Gravis-like colony type

24 hours—size 1–1.50 mm (av. 1.25 mm), gray, with dark grayish-black center, translucent periphery, raised and round. In some strains edge is crenated to a variable extent; is brittle and tends to fracture radially when touched with a needle.

Small-colony type

24 hours—colonies minute (0.25 mm and less); grayish with slight darkening in some colonies, variation in size, round, convex, entire edge, somewhat rough.

Colonial morphology of other organisms appearing on the plates

1. *Staphylococci.* in 24 hours colony varies in size in different strains, somewhat flat with elevated center, glistening, round, black, or bluish black and with very thin translucent entire periphery.
2. *Diphtheroids:* in 24 hours, very small dead white and pin-point in size, but a few strains have brown tint and are larger.
3. *Yeasts:* in 24 hours, white, moist to dry, round and varying in size according to species.
4. *Spore formers:* in 24 hours, usually light brown, usually mucoid, good size but not spreading unless the medium is quite moist. Generally entirely suppressed.
5. *Micrococci:* in 24 hours, round, raised, grayish, glistening, and resembles the mitis diphtheria type colony somewhat. Often shows some blackening in center of colony which helps to differentiate it, but this is not always seen.
6. *Streptococci:* in 24 hours, vary in size, texture, and elevation; majority of strains small, flat, round, with glistening black centers, periphery is thin, translucent; some strains are light brown in color while others are black. These may have to be picked to be certain of their identification.
7. *Pneumococci·* in 24 hours, round, flat, dull, dark greenish colony with lighter greenish edge; matt-like texture.

Cellular Morphology

As stated above, accurate diagnosis, based on examination of stained smears, depends on the ability of the microscopist to recognize a range of morphological variants of the diphtheria bacillus. This cellular variation—which is most pronounced when the organism is grown on a medium of inconstant composition such as Loeffler slants—is generally thought of as quite characteristic and easily recognizable. On the other hand it is commonly believed that diphtheria bacilli when grown on tellurite media are shorter, thicker, and stain more uniformly, and are thus more difficult to recognize. For this reason it has been suggested by some authors that both media should be used, the colonies being picked from the tellurite medium and the morphology being studied from the Loeffler. Such a procedure may be satisfactory if the objective is to isolate pure cultures, but it certainly has nothing to recommend it in the routine diagnostic laboratory where a report to the physician must be made at the earliest possible moment.

It is of interest, therefore, to call attention to the fact that the cellular morphology of diphtheria bacilli on dextrose serum tellurite agar is not so different from that seen from Loeffler as to present a serious problem in recognition, and therefore smears may be made directly from the plates. It is true that many of the cells will be thicker and more heavily stained—probably because the medium offers a more nutritive base than Loeffler—but there is a remarkable uniformity of cellular morphology as related to colonial type.

This correlation is indicated by the following description:

Intermedius colony type
Pleomorphic, with club-shaped forms occasionally seen. Few or no metachromatic granules. Many solid staining forms. Barred cells are deeply stained with pale blue areas between the bars.

Mitis-like colony type
Pleomorphic, with well developed metachromatic granules in most strains. Barred forms infrequent. Typical, rather slender rods as compared to intermedius colony type above.

Gravis-like colony type
Uniform, short, stout, heavily staining. Occasional tear, club and wedge-shaped forms seen. Some barred and shadow forms may be present. Most organisms resemble diphtheroids.

Small colony type
Slender, branching, filamentous bacilli. Fungus-like arrangement.

Comparative Results Obtained Using Loeffler Slants and Dextrose Serum Tellurite Plates

As a means of determining the relative utility of Loeffler slants and dextrose serum tellurite plates in routine diagnostic work, nose and throat swabs received from physicians were first streaked on Loeffler slants and then on the plates. After 18–24 hours incubation smears were made from the Loeffler slants, the plates were scanned for typical diphtheria colonies and when these were seen, smears were made from them for microscopic study. Examination of the stained smears in each instance was made by an experienced person.

Results obtained in parallel examinations made from Loeffler slants and dextrose serum tellurite plates in 259 positive specimens are shown below. Excluded are the specimens in which the Loeffler and plate were both negative.

	*L+ **T+	L+ T−	L− T+	L unsatisfactory T+
Total (259)	222	6	29	2

*L=Loeffler **T=Tellurite

Analysis of these data indicates agreement in 222 of the specimens. In six instances a positive diagnosis was made from the Loeffler slant when the tellurite plate was negative, but in two of these cases it would seem probable that the organism seen in the Loeffler smear and called diphtheria was really a diphtheroid as this was the only thing which grew on the plates. On the other hand there were 29 cases in which the smears from Loeffler slants were negative and the plates showed the presence of diphtheria bacilli. Finally, there were two instances in which no examination could be made from the Loeffler slants, due to digestion of the medium by a proteolytic organism, but typical colonies of diphtheria appeared on the plates.

In summary, then, it appears the slant and plate were in agreement in 85 percent of the cases, in 2 percent of the cases the slant was positive and the plate negative, and in 11 percent of the cases the slant was negative and the plate positive.

As a result of this comparative testing it has become evident that on the plates *C. diphtheriae* produces easily recognized colonies and that at the critical time—after 18–24 hours incubation—diphtheroids are usually completely inhibited, or, if they do come up can be readily distinguished. Simple scanning of the plates, then, serves to confirm as true diphtheria bacilli the tentative conclusion of the microscopist as to the identity of cells seen in smears made from Loeffler slants. Negative reports may also be made with assurance in instances where diphthomorphic organisms are seen in smears made from Loeffler but where there are no characteristic colonies on the plates.

Résumé

Ever since its introduction Loeffler's coagulated blood serum has been the medium most widely used in diagnostic laboratories for growth of diphtheria bacilli from nose and throat swabs. The advantages of this medium have been presumed to be that: (1) it grew diphtheria rapidly; (2) it grew all types of diphtheria organisms; (3) it was conducive to the development of the most characteristic cellular morphology and arrangement of the organism thereby making recognition easy in stained smears made from the medium.

In recent years Loeffler has been criticized because it has been shown that: (1) its "supposed growth-promoting properties are illusory"; (2) its failure to restrict commensal organisms often resulted in overgrowth when only a few diphtheria bacilli were present; (3) it was often rendered useless because of digestion by proteolytic organisms; (4) its composition was extremely variable; (5) the cellular morphology of diphtheria bacilli is much modified by differences in composition of the medium; (6) it fails to grow some strains of diphtheria bacilli.

To overcome these drawbacks a variety of media, all containing one or another of the salts of tellurous acid, have been developed and given more-or-less wide trial. Advantages claimed for these media have been stated to be that: (1) they gave more positives than did other media; (2) they were not digested by proteolytic organisms; (3) they inhibited many commensal organisms; (4) if they were used as plating media they brought out differential colonial characteristics of diphtheria colonies.

The disadvantages of these media have been: (1) that if sufficiently restrictive to inhibit commensal organisms they have also inhibited some strains of diphtheria; (2) the cellular morphology of diphtheria bacilli was so altered as to make microscopic recognition of the organism difficult; (3) colonies of *C. diphtheriae* have been too small after 18–24 hours' incubation to exhibit differential features.

This investigation was undertaken to develop a plating medium on which: (1) no known strain of diphtheria bacilli would be inhibited (2) colonies of diphtheria would be large enough perhaps to show differential features after 18–24 hours growth; (3) cellular morphology of diphtheria bacilli would not be so altered as to be difficult of recognition; (4) commensal organisms from the nose and throat might be inhibited to a large extent, and (5) pure cultures of diphtheria might be picked after 18–24 hours incubation, thus shortening the time needed for the performance of virulence tests.

After the trial of many formulae and an experience extending over a number of years the described dextrose serum tellurite medium was evolved. In our hands it has met the stated needs, and the comparative results using it in parallel with Loeffler have been set forth in the table. In this summary the time of comparison covered was only about a year, but actually the comparison has been in progress for the past several years.

The points of most significance in connection with dextrose serum tellurite agar are: (1) it is *noninhibitory* for any strain of diphtheria within our experience; (2) it is inhibitory for many of the commensal organisms found in nose and throat cultures; (3) it is uniform in composition; (4) the morphology of diphtheria bacilli is practically unaffected when the organisms are grown on different lots of the medium; (5) the different colonial types of diphtheria are distinguishable; (6) at 18–24 hours of age the diphtheria colonies are differential, and confirmatory evidence as to their identity may be obtained from microscopic examination of smears made from them.

Conclusions

1. Reliance on microscopic examination of stained smears from Loeffler slants for diagnosis of diphtheria may result in error because:

(a) Not all strains of *C. diphtheriae* will grow on this medium.

(b) The cellular morphology may be so altered as to be unrecognizable because of variations in the composition of the medium.

(c) Small numbers of diphtheria bacilli may be masked due to overgrowth of commensal organisms.

(d) The medium may be digested by proteolytic organisms present in the inoculum

2. The laboratory diagnosis of diphtheria would become more objective and reliable if the specimen from the patient could be planted simultaneously on Loeffler and a plating medium on which *C. diphtheriae* would appear in differential colonies and from which microscopic examination could be made directly.

3. The formula for such a medium has been presented.

4. The advantages of this medium are:

(a) It grows all types of *C. diphtheriae*.

(b) It yields more positives than does Loeffler.

(c) The growth of diphtheroids is usually surpressed up to 24 hours and when they do come up it is in easily differentiated colonies.

(d) The characteristic cellular morphology of *C. diphtheriae* growing on the medium is not greatly altered.

(e) The colonial morphology of *C. diphtheriae* is distinct and recognition of typical colonies serves to confirm tentative conclusions based on smear examinations.

(f) The colonies are large enough to be easily identified after 18–24 hours incubation, i. e., at the time when diagnostic smears are being made from Loeffler.

(g) If isolation of pure cultures is desired this may be accomplished at 18–24 hours after inoculation of the medium.

(h) It is easy to prepare and of uniform composition.

(i) It does not become toxic on storage.

(j) It is not digested by proteolytic organisms.

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A Flocculation Test as a Possible Method for Differentiating Immunologic Types of the Poliomyelitis Virus[1]

By E. C. Roberts, M. D.[2]

All early attempts to develop an *in vitro* serological test for poliomyelitis were unsuccessful, as pointed out by Raffel and Schultz (*1*). More recently, complement fixation reactions with the Lansing strain of poliomyelitis virus (*2*) have been obtained with highly concentrated antigens prepared by several cycles of ultracentrifugation. However, the amount of material and work required for the preparation of this antigen made this method impractical for use as a routine procedure.

Attempts to develop an *in vitro* test were begun in 1940 with the development of the bacterial agglutination (B. A.) test (*3, 4*). Results obtained with this test suggested that a possible approach might lie in the adsorption of the virus by other particles. Inasmuch as the adsorption of the virus particle on the bacterial cell is influenced by factors many of which are not understood and therefore cannot be controlled, it was considered that the substitution of another particle for the bacterial cell might present an advantage. Since the virus particle bears a negative charge it was thought that a positively charged protein (protamine) might overcome some difficulties of adsorption.

In the test to be described (the flocculation reaction) it is presumed that the positively charged protamine molecule adsorbs a few negatively charged virus particles as well as other molecules in the suspension. Thus these "built up" particles may possess sufficient

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[2] From the Neurotropic Virus Unit, The George Williams Hooper Foundation, University of California, San Francisco.

mass and other properties necessary to give a visible reaction in the presence of specific antibody.

Early in the work it became evident that central nervous system tissue contains a substance or substances which interfere with the flocculation reaction. These substances could be removed occasionally by the rapid and repeated freezing and thawing process outlined by Casals (*5*). Freezing and thawing at certain specific pH levels aided in the removal of the interfering substance, yet only 10 percent of the antigens thus prepared proved active. After the purification of influenza virus by methanol precipitation in the cold (*6*) was achieved, this procedure was applied to the virus of poliomyelitis. However, it was found that the undesirable normal component was precipitated with the virus. Nevertheless, this led eventually to the now successful method of removing this inhibiting substance. The method used at the present for the preparation of the flocculating antigen is a combination of freezing and thawing, pH adjustment, and methanol precipitation similar to that outlined by Gollan (*7*). The final preparation represents a 10-fold concentrate of the original 10 percent suspension.

Before performing the flocculation test, the correct amount of protamine to be added to the virus suspension must be determined. Various quantities of protamine sulfate solution are added to constant portions of partially purified virus suspension and incubated first at room temperature and then at 43° C. to fix the combination. These antigens are added to serial 2—fold dilutions of inactivated monkey convalescent serum. The tubes are then incubated at 43° C. for 3 hours. The precipitate is composed of thin, grey, transparent flakes. The amount of protamine that gives the best reaction is then added to the virus suspension, making the antigen used in setting up the flocculation test with unknown sera. This is conducted in the same manner as the preliminary titration.

A detailed description of the procedure is being prepared for publication elsewhere (*8*).

It is encouraging to find that antigens can be stored at —15° C. for at least one month without loss of activity. This activity appears to be related to the virus since Lansing antigen possessing an infectivity titer of 10^{-5+} gave reactions of 1:160 with monkey convalescent serum while an antigen with a titer of 10^{-4} gave a reaction of only 1:20 with the same serum. The flocculation test is simple and all reagents can be titrated and standardized. At present the antigen is not titrated since we are still on the threshold of the reacting dose. Improvement in preparation of the antigen should result in preparations sufficiently active to be titrated.

Antigens prepared from mouse brains and spinal cords infected with Lansing poliomyelitis virus gave reactions with pooled adult human serum and hyperimmune MEF_1 (a strain known to be antigenically similar to Lansing and adaptable to cotton rats and mice) monkey serum (*9*). Normal monkey sera failed to react. Also antigens prepared from normal mouse brains as well as those infected with the Jungeblut murine-adapted SK virus failed to react with the above sera. The specificity of the reaction was further indicated when monkey serum taken before immunization failed to elicit a reaction with the Lansing antigen while strong reactions were obtained with serum taken after immunization with the MEF_1 virus. Serum from monkeys immunized with an unrelated strain of monkey-adapted poliomyelitis virus failed to react. In addition, partially purified suspensions of Lansing virus first added to the serum inhibited the flocculation reaction while similarly prepared normal mouse brain and Jungeblut SK virus suspensions failed to do so.

After the specificity of the test had been determined it was applied to antigens of the following monkey adapted strains: the MEF_1 strain from Dr. P. K. Olitsky, the Kosh and Campbell strains which were isolated in our laboratory, the BK and McKay supplied by Dr. John Kessel, and the Brunhilde and Frederick strains supplied by Dr. H. Howe.

The antigens prepared from infected tissue were tested with monkey sera. The Lansing, MEF_1, Kosh, Campbell, and McKay sera were from convalescent monkeys. The serum was drawn 16 days after paralysis developed. Convalescent monkey serum to the BK virus was obtained from Dr. John Kessel. Hyperimmune monkey sera to the Brunhilde and Frederick viruses were obtained from Dr. H. Howe.

Typical reactions obtained with two antigens (MEF_1 and Kosh) tested against several sera are presented in tables 1 and 2.

Table 1. *Reactions with MEF_1 antigen*

Sera	Reciprocal of serum dilution						
	10	20	40	80	160	320	Antigen control
MEF_1	--------	+	+	++	+++	+	0
Frederick	0	0	0	0	0	--------	0
Brunhilde	0	0	0	0	0	--------	0
Kosh	0	0	0	0	0	--------	0

Table 2. *Reactions with Kosh antigen*

Sera	Reciprocal of serum dilution						
	10	20	40	80	160	320	Antigen control
Kosh	--------	0	+	+	+	+	0
Brunhilde	0	0	0	0	0	--------	0
Frederick	0	0	0	0	0	--------	0
Campbell	0	+	+	+	0	--------	0

Antigens prepared from the eight strains of poliomyelitis virus have been tested with some or all of the eight sera and in most cases by reciprocal titrations. When it became evident that the Lansing and MEF ₁ viruses were closely related, the Lansing virus and serum were excluded from later titrations.

From these reactions the relationship of the eight viruses, as determined by the flocculation reaction, is indicated in table 3.

Table 3. *Relationship of poliomyelitis viruses by flocculation reaction*

Sera	Antigens							
	Lans	MEF ₁	Kosh	Camp	BK	Fred	McKay	Brun
Lansing	+	+	0	--------	--------	--------	--------	--------
MEF ₁	+	+	0	--------	0	0	--------	--------
Kosh	0	0	+	+	+	+	+	+
Campbell	--------	0	+	+	+	0	--------	--------
BK	--------	0	+	+	+	0	--------	--------
Brunhilde	--------	0	0	0	0	0	0	+
Frederick	--------	0	0	0	0	+	+	--------
McKay	--------	--------	+	+	+	0	+	--------

Of the eight strains of poliomyelitis virus tested there appear to be two distinct groups. The Lansing and MEF_1 viruses are closely related as has been shown by neutralization tests. They are distinct from five of the other six viruses (not compared with McKay strain). No close antigenic relationship between the Lansing and BK strains is indicated by challenge of BK convalescent monkeys (*10*). The second group includes Kosh, Campbell, BK, McKay, Brunhilde and Frederick viruses. Whether the failure of the Brunhilde and Frederick sera to react with Kosh, Campbell and BK antigens indicates possible sub-groups or results from the difference in the preparation of the sera (hyperimmune rather than convalescent) must be determined by further study. In either case these viruses are included within the group by the reaction of their antigens with the Kosh serum and by the reaction of the Frederick serum with the McKay antigen.

These results agree in general with those obtained in monkey neutralization and immunity experiments. In our laboratory the Campbell serum has neutralized the Kosh virus. Kessel (*10*) has demonstrated BK convalescent monkeys to be resistant to challenge with the McKay and Frederick viruses.

These results suggest that the flocculation test might offer a method for the grouping of the poliomyelitis viruses. The test offers a relatively inexpensive method since the cords of two monkeys supply sufficient antigen to test eight or ten sera.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JANUARY 29, 1949

A total of 15,266 cases of measles was reported for the current week, as compared with 13,392 last week and a 5-year (1944–48) median of 6,712. Increases were recorded in all geographic divisions (the largest in the East South Central and South Atlantic) except the New England and West North Central. Of the current total an aggregate of 10,522 cases occurred in 12 States, as follows (last week's figures in parentheses): Massachusetts 1,171 (1,373), New York 993 (839), Pennsylvania 1,145 (1,060), Michigan 559 (391), Wisconsin 583 (511), Maryland 774 (724), Virginia 815 (455), Kentucky 511 (97), Alabama 521 (250), Texas 2,086 (2,005), Oregon 474 (550), California 890 (685). The totals for the year to date and since the average seasonal low week in September are, respectively, 51,608 and 104,001 cases, as compared with last year's figures, the highest of the past 4 years, of 33,414 and 68,360. The respective corresponding 5-year medians are 20,285 and 46,409.

The current influenza incidence is 4,534 cases, as compared with 4,585 last week and a 5-year median of 14,253. An aggregate of 3,959 cases was reported in 6 States, as follows (last week's figures in parentheses): Virginia 464 (440), South Carolina 625 (601) Alabama 101 (66), Arkansas 290 (221), Texas 2,327 (2,558), Arizona 152 (147).

Of 95 cases of poliomyelitis (last week 113, 5-year median 36), California reported 30, Texas 14, North Carolina 9, and Arizona 6.

Of 26 cases of tularemia (last week 29, 5-year median 17), 8 occurred in Georgia, 5 in North Carolina, 3 in Illinois, and 10 in 6 other States. The total for the year to date is 145, same period last year 101, 5-year median 104.

During the week 2 cases of psittacosis were reported in Virginia. Pennsylvania and Kansas each reported 1 case of anthrax, and Kentucky and Tennessee each 1 case of Rocky Mountain spotted fever.

Deaths recorded during the week in 94 large cities in the United States totaled 9,518, as compared with 9,910 last week, 10,478 and 9,654, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year median of 10,156. The total to date is 40,114, same period last year 42,360. Infant deaths totaled 635, last week 685, 3-year median 677. The cumulative figure is 2,745, same period last year 2,913.

Telegraphic case reports from State health officers for week ending January 29, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	----	374	1	9	----	----	9	----	----	----	10	----
New Hampshire	----	----	----	10	----	----	----	----	5	----	----	----	2	----
Vermont	1	----	----	276	----	----	----	----	10	----	----	----	10	----
Massachusetts	9	----	----	1,171	2	----	----	----	313	----	----	----	67	----
Rhode Island	----	----	----	195	----	9	----	----	•5	----	----	----	4	----
Connecticut	2	----	11	207	2	71	----	----	42	----	----	----	14	----
MIDDLE ATLANTIC														
New York	3	----	[b] 2	993	5	289	3	----	•264	----	----	2	154	5
New Jersey	1	----	----	338	3	64	2	----	127	----	----	----	64	5
Pennsylvania	7	1	[b]	1,145	4	----	1	----	261	----	----	5	74	----
EAST NORTH CENTRAL														
Ohio	12	----	6	62	1	50	1	----	334	----	1	1	41	23
Indiana	13	2	60	59	1	25	1	----	58	----	----	1	30	17
Illinois	1	1	3	64	5	108	----	----	203	----	3	1	41	2
Michigan [a]	2	----	2	559	1	31	3	----	367	----	----	----	57	----
Wisconsin	----	----	23	583	7	17	----	----	83	----	----	----	52	1
WEST NORTH CENTRAL														
Minnesota	5	----	----	22	1	3	2	----	92	----	----	----	3	----
Iowa	----	----	----	17	3	3	3	----	65	----	----	----	4	5
Missouri	3	----	11	350	7	25	----	----	26	----	2	1	5	----
North Dakota	----	----	5	17	----	----	----	----	19	----	----	----	4	----
South Dakota	----	----	3	33	1	----	----	----	4	----	----	----	4	----
Nebraska	----	----	----	10	----	----	2	----	10	----	----	----	----	----
Kansas	1	----	3	286	2	28	1	----	35	----	----	----	2	1
SOUTH ATLANTIC														
Delaware	----	----	----	12	----	----	1	----	5	----	----	1	1	----
Maryland [a]	4	----	----	774	2	41	2	----	•31	----	----	1	4	----
Dist. of Col	----	----	----	49	1	14	----	----	11	----	----	1	5	----
Virginia	1	----	464	815	----	106	2	----	17	----	----	----	20	2
West Virginia	5	----	44	144	----	19	----	----	34	----	----	----	6	----
North Carolina	11	----	----	232	1	----	9	----	37	----	5	2	25	----
South Carolina	10	----	625	58	----	173	----	----	6	----	2	----	36	3
Georgia	1	----	27	84	2	51	1	----	21	----	8	3	1	15
Florida	4	1	22	112	----	14	1	----	9	----	----	----	12	1

EAST SOUTH CENTRAL														
Kentucky	3	----------	36	511	4	41	----------	1	85	----------	----------	4	154	11
Tennessee	2	----------	52	84	5	48	----------	1	48	----------	1	----------	3	----------
Alabama	14	----------	101	521	1	57	2	----------	12	----------	----------	----------	52	2
Mississippi [a]	5	----------	31	13	1	38	----------	----------	6	----------	2	1	8	----------
WEST SOUTH CENTRAL														
Arkansas	5	----------	290	279	----------	89	----------	----------	4	----------	----------	3	1	2
Louisiana	2	----------	1	43	1	25	----------	----------	7	----------	----------	----------	4	----------
Oklahoma	6	----------	47	207	----------	61	----------	----------	22	----------	----------	1	----------	5
Texas	36	----------	2,327	2,086	11	478	14	----------	27	----------	----------	5	85	34
MOUNTAIN														
Montana	----------	----------	9	50	----------	----------	----------	----------	7	----------	----------	----------	----------	----------
Idaho	3	----------	33	50	----------	12	1	----------	[c] 22	----------	----------	----------	2	----------
Wyoming	----------	----------	----------	22	1	2	----------	----------	7	----------	----------	----------	----------	----------
Colorado	1	----------	74	182	----------	32	----------	----------	23	----------	----------	----------	6	----------
New Mexico	1	----------	2	302	----------	16	----------	----------	14	----------	----------	1	3	----------
Arizona	3	----------	152	81	----------	37	6	----------	3	----------	----------	----------	20	----------
Utah [a]	4	----------	----------	76	----------	12	----------	----------	4	----------	2	----------	20	----------
Nevada	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
PACIFIC														
Washington	----------	----------	14	344	3	1	5	----------	63	----------	----------	----------	25	----------
Oregon	1	----------	26	474	----------	30	2	----------	9	----------	----------	----------	20	----------
California	8	1	28	890	7	53	30	----------	116	----------	----------	4	52	2
Total	190	6	4,534	15,266	86	2,182	95	2	2,982	----------	26	38	1,207	----------
Median, 1944-48	294	6	14,253	6,712	216	----------	36	----------	3,123	4	17	46	2,117	----------
Year to date 4 weeks	775	29	17,341	51,608	350	8,488	494	7	10,235	1	145	148	4,208	----------
Median, 1944-48	1,277	26	46,635	20,285	909	----------	160	1	10,939	29	104	160	8,985	----------
	(27th)	----------	(30th)	(35th)	(37th)	----------	(11th)	----------	(32nd)	(35th)	----------	(11th)	(39th)	----------
Seasonal low week ends	July 10		July 31	Sept. 4	Sept. 18		Mar. 20		Aug. 14	Sept. 4		Mar. 20	Oct. 2	----------
Since seasonal low week	5,889	----------	53,611	104,001	1,194	----------	27,821	----------	32,933	16	----------	3,267	14,241	----------
Median, 1943-48	8,843	----------	90,193	46,4[illegible]	2,413	----------	13,547	----------	49,510	105	----------	4,420	33,837	----------

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[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever, currently reported separately, as follows: New York 1; Georgia 1; salmonella infections, not included, were reported as follows: New York 3; Maryland 1.

Anthrax: Pennsylvania 1; Kansas 1.

Psittacosis: Virginia 2 cases, 1 each in Henrico and Louisa Counties.

Alaska: Measles 3; pneumonia 1; streptococcal throat 17.

Territory of Hawaii: Influenza 18; measles 410; whooping cough 4.

TERRITORIES AND POSSESSIONS

Virgin Islands of the United States

Notifiable diseases—October–December 1948.—During the months of October, November, and December 1948, cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	October	November	December
Cancer	1		5
Chickenpox	1		
Fever, undetermined			1
Filariasis	2		
Gonorrhea	9	18	15
Hookworm disease			4
Measles	11	13	
Pneumonia, broncho	1		
Syphilis	26	24	13
Tuberculosis, pulmonary		3	

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended January 8, 1949.—During the week ended January 8, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chicken pox		63	2	225	1,045	57	102	161	321	1,976
Diphtheria		1		30	5	1		3		40
Dysentery, bacillary				1						1
German measles		3		23	14		2	9	4	55
Influenza		29			7					36
Measles		125		110	221	106	79	195	84	920
Meningitis, meningococcal.		1	1	1					1	4
Mumps		17		50	329	41	37	16	211	701
Poliomyelitis									1	1
Scarlet fever		6		153	89	7	4	9	9	277
Tuberculosis (all forms)		7	17	69	20	6	4	18	43	184
Typhoid and paratyphoid fever.				3	1					4
Undulant fever					2	1			1	4
Venereal diseases:										
Gonorrhea	2	24	10	132	72	22	20	37	40	359
Syphilis	4	5	10	72	40	14	3	7	8	163
Other forms									2	2
Whooping cough		3		72	40	8	14			137

Diphtheria

Alberta.—Information from Calgary, Canada, dated January 27, 1949, states that six cases of diphtheria with one death have occurred at Nobleford, Alberta, just north of Lethbridge.

CUBA

Habana—Communicable diseases—5 weeks ended December 31, 1948.—During the 5 weeks ended December 31, 1948, certain communicable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths
Chickenpox	3	
Diphtheria	15	
Measles	2	
Tuberculosis	7	
Typhoid fever	11	1

Provinces—Notifiable diseases—5 weeks ended December 31, 1948.—During the 5 weeks ended December 31, 1948, cases of certain notifiable diseases were reported in the provinces of Cuba, as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	5	6	12	24	3	27	77
Chickenpox		3			1		4
Diphtheria	1	18	2	2	1	4	28
Hookworm disease		7					7
Leprosy	1	1		1		1	4
Malaria	1	5	1	11	10	402	430
Measles		4				1	5
Poliomyelitis		1				1	2
Scarlet fever		1					1
Tuberculosis	8	12	8	15	16	19	78
Typhoid fever	8	19		15	6	38	86
Undulant fever		1					1
Whooping cough		104					104

[1] Includes the city of Habana.

JAPAN

Notifiable diseases—4 weeks ended December 25, 1948, and accumulated totals for the year to date.—For the 4 weeks ended December 25, 1948, and for the year to date, certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended December 25, 1948		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	1,636	215	16,170	1,498
Dysentery, unspecified	182	64	14,638	4,044
Encephalitis, Japanese "B"	12	9	[1] 7,666	2,950
Gonorrhea	13,041		217,918	
Influenza	142		2,809	
Malaria	102	2	4,933	42
Measles	3,884		54,669	
Meningitis, epidemic	83	21	2,038	512
Paratyphoid fever	173	5	2,890	148
Pneumonia	7,512		110,593	
Scarlet fever	390	6	2,918	44
Smallpox	1[1]		29	1
Syphilis	14,805		214,535	
Tuberculosis	27,204		378,523	
Typhoid fever	661	74	9,414	1,122
Typhus fever	37	1	488	83
Whooping cough	3,843		52,789	

[1] Includes suspected cases.

Note.—The above figures have been adjusted to include delayed and corrected reports.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Madras Province.—Cholera has been reported in Madras Province, India, as follows: Week ended December 18, 1948, 1,115 cases with 594 deaths; week ended December 25, 1948, 1,207 cases with 642 deaths.

Pakistan—Chittagong.—During the period January 1–15, 1949, 24 cases of cholera with 17 deaths were reported in Chittagong, Pakistan.

Plague

Belgian Congo—Stanleyville Province—During the week ended January 22, 1949, 2 fatal cases of plague were reported northeast of Blukwa in Stanleyville Province, Belgian Congo.

Burma—Plague has been reported in Burma as follows: Week ended November 27, 1948, 39 cases, 35 deaths; period November 28–December 31, 1948, 151 cases, 111 deaths; week ended January 8, 1949, 52 cases, 38 deaths.

Portugal—Azores.—Bubonic plague has been reported in the Azores Islands as follows: During the week ended November 13, 1948, 1 case at Ponta del Gada, Arrifes District; week ended November 27, 1948, 1 case Ribeira Grand, Matriz District.

Smallpox

Bahrein Islands.—During the week ended January 15, 1949, 19 cases of smallpox with 2 deaths were reported in the Bahrein Islands.

India—Ahmedabad.—Smallpox has been reported in Ahmedabad, India, as follows: For the week ended January 1, 1949, 32 cases, 16 deaths; week ended January 8, 1949, 80 cases, 32 deaths.

Iraq.—For the week ended January 22, 1949, 48 cases of smallpox with 9 deaths were reported in Iraq, including 15 cases, 4 deaths in Baghdad City.

Syria—Aleppo.—During the week ended December 25, 1948, 29 cases of smallpox were reported in Aleppo, Syria.

Transjordan—Amman.—Smallpox has been reported in Amman, Transjordan, as follows: For the week ended December 18, 1948, 7 cases; week ended January 8, 1949, 2 cases; week ended January 15, 1949, 11 cases.

Yellow Fever

Panama.—Information dated January 31, 1949, states that the outbreak of jungle yellow fever reported recently at Pacora, Panama, is under control. Of the confirmed deaths reported, the last one is stated to have occurred on December 30, 1948.

DEATHS DURING WEEK ENDED JAN. 22, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Jan. 22, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,910	10,305
Median for 3 prior years	10,181	------------
Total deaths, first 3 weeks of year	30,596	31,882
Deaths under 1 year of age	685	728
Median for 3 prior years	722	------------
Deaths under 1 year of age, first 3 weeks of year	2,110	2,233
Data from industrial insurance companies:		
Policies in force	70,650,802	66,909,483
Number of death claims	13,338	14,692
Death claims per 1,000 policies in force, annual rate	9.8	11.5
Death claims per 1,000 policies, first 3 weeks of year, annual rate	9.4	11.3

Notifiable Diseases, Third Quarter, 1948[1]

The figures in the following table are the totals of the monthly morbidity reports received from State health authorities for July, August, and September, 1948. These reports are preliminary and the figures are more or less incomplete and subject to correction by final reports. The figures may be assumed to represent the civilian population only, although in some instances a few cases in the military population may be included. The comparisons made are with similar preliminary reports; but, owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The list of diseases required to be reported is not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these and other deficiencies inherent in morbidity reporting, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic distribution of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for July, August, and September 1948

Division and State	Anthrax	Chickenpox	Conjunctivitis[2]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria[3]	Measles*	Meningitis, meningococcus*	Mumps	Ophthalmia	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	--------	279	--------	5	--------	--------	--------	--------	20	--------	6	--------	535	9	85	--------	--------	113
New Hampshire	--------	32	--------	--------	--------	--------	--------	--------	9	--------	17	--------	200	2	57	--------	--------	9
Vermont	--------	171	--------	--------	--------	--------	--------	--------	37	--------	--------	--------	204	1	50	--------	--------	6
Massachusetts	--------	917	--------	61	2	30	--------	5	166	--------	--------	6	3,200	16	1,566	[4] 97	--------	[5] 476
Rhode Island	--------	37	1	2	2	4	--------	1	5	--------	2	2	44	2	67	--------	1	35
Connecticut	--------	350	109	4	1	5	--------	2	51	--------	7	4	528	9	516	1	--------	285
MIDDLE ATLANTIC																		
New York	1	1,809	5	56	109	77	--------	7	[6] 167	[6] 32	[6] 13	19	6,074	44	[6] 619	[4] 17	--------	1,820
New Jersey	--------	167	--------	22	12	2	--------	--------	205	--------	15	12	3,742	21	2,261	[4] 2	--------	467
Pennsylvania	3	777	--------	48	3	1	1	4	--------	--------	18	--------	2,841	36	1,246	5	--------	618
EAST NORTH CENTRAL																		
Ohio	--------	758	--------	65	10	19	2	--------	[6] 40	--------	13	5	906	18	362	[4] 119	--------	343
Indiana	--------	72	--------	42	2	8	5	9	22	--------	21	7	264	5	117	--------	1	69
Illinois	--------	799	3	16	84	42	--------	26	60	2	25	[7] 7	614	45	1,035	26	--------	989
Michigan	--------	850	6	15	219	22	--------	5	100	15	3	10	2,698	19	800	--------	--------	311
Wisconsin	--------	1,221	--------	4	2	--------	--------	2	129	--------	33	1	2,732	9	1,453	--------	--------	[5] 48

WEST NORTH CENTRAL																		
Minnesota	------	128	------	21	12	88	1	4	------	------	5	15	159	9	------	------	------	112
Iowa	------	------	------	10	3	------	------	12	------	------	------	1	188	11	------	------	------	9
Missouri	------	34	------	23	------	------	7	------	1	------	5	1	150	27	96	1	------	180
North Dakota	------	19	1	7	1	------	------	24	------	------	12	------	140	6	------	------	------	181
South Dakota	1	16	------	7	------	------	------	21	------	------	------	------	78	3	10	------	------	28
Nebraska	------	75	------	7	3	------	------	4	------	------	34	1	164	2	77	------	------	2
Kansas	------	62	------	35	2	1	2	14	14	------	18	1	112	6	211	------	------	91
SOUTH ATLANTIC																		
Delaware	------	8	------	2	------	------	------	1	------	------	------	------	30	1	34	------	------	3
Maryland	------	124	------	26	1	20	63	------	24	------	1	1	1,438	3	247	2	4	226
District of Columbia	------	54	------	1	4	27	------	------	------	------	------	1	119	4	------	------	------	109
Virginia	------	138	------	41	1	------	1,655	2	------	------	2,527	15	637	19	332	------	2	304
West Virginia	------	21	------	30	------	------	------	------	28	------	72	------	142	16	80	------	------	31
North Carolina	------	------	------	117	9	12	------	1	------	------	------	89	164	17	------	------	------	------
South Carolina	------	111	------	170	20	312	------	5	29	444	1,654	1,723	283	5	633	[4] 5	160	655
Georgia	------	40	5	108	3	137	9	2	------	799	160	21	73	12	348	1	27	325
Florida	------	27	------	65	32	28	11	1	9	743	27	56	223	8	125	[4] 7	4	94
EAST SOUTH CENTRAL																		
Kentucky	------	44	1	52	8	27	------	------	32	------	2	17	241	17	85	2	------	239
Tennessee	------	64	------	52	132	73	13	9	14	1	87	52	223	31	158	[4] 2	11	325
Alabama	------	22	------	114	9	------	------	4	1	------	48	90	83	22	134	------	7	213
Mississippi	------	------	------	69	30	119	------	4	------	717	------	33	65	14	------	[4] 8	------	171
WEST SOUTH CENTRAL																		
Arkansas	------	74	------	28	63	64	371	1	14	------	342	298	193	14	80	------	------	139
Louisiana	------	60	------	13	55	4	------	2	------	38	61	27	30	5	39	------	1	307
Oklahoma	------	35	------	16	11	8	54	------	11	7	129	167	142	14	97	1	4	97
Texas	------	------	------	183	282	5,649	1,591	2	------	------	------	1,363	2,790	40	------	[4] 13	------	863
MOUNTAIN																		
Montana	------	206	1	6	------	4	------	2	6	------	49	1	97	3	236	1	------	58
Idaho	------	66	7	8	------	2	------	------	20	------	86	------	145	2	145	------	------	35
Wyoming	------	45	------	1	------	------	------	1	4	------	1	------	66	2	43	------	------	23
Colorado	------	240	------	19	2	14	------	1	67	------	127	1	922	7	521	------	------	138
New Mexico	------	27	9	[8] 9	6	14	[7] 22	1	14	------	10	3	139	2	49	6	2	105
Arizona	------	41	15	24	15	140	223	3	29	------	173	3	195	1	101	[4] 1	5	160
Utah	------	183	------	[8] 39	1	1	------	------	13	[8] 1	------	------	[8] 982	------	181	------	------	38
Nevada	------	11	2	------	------	------	------	------	------	------	5	2	66	------	8	------	1	------
PACIFIC																		
Washington	------	338	7	18	4	8	11	2	85	------	10	------	784	2	620	------	------	187
Oregon	------	------	7	7	39	3	1	------	------	------	------	1	869	2	------	------	------	117
California	------	1,810	------	72	75	144	------	42	346	------	70	16	3,561	56	3,587	6	------	[8] 261
Total	5	12,362	179	1,740	1,269	7,109	4,042	226	1,781	2,799	5,888	4,067	40,449	618	18,471	323	280	11,086
Third quarter 1947	15	13,421	255	2,039	812	4,212	2,476	329	2,151	2,286	7,581	7,126	17,600	622	14,969	308	366	8,744
Median 1943-47	15	13,421	180	3,046	1,044	11,715	4,369	289	2,161	3,479	12,515	22,246	19,452	1,283	14,969	337	1,110	13,337
Alaska	------	48	------	2	------	------	------	------	16	------	9	------	13	1	10	------	------	19
Hawaii Territory	------	198	5	------	1	7	------	------	55	------	1	1	82	1	386	------	------	[8] 20
Panama Canal Zone [16]	------	42	------	20	5	10	------	------	------	------	------	291	24	10	31	------	------	[11] 52

See footnotes on page 228

Consolidated monthly State morbidity reports for July, August, and September, 1948—Continued

Division and State	Polio-myelitis*	Rabies in man	Rheumatic fever [13]	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Small-pox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping cough*
NEW ENGLAND																			
Maine	29		2		58	4				5	131	123		7				2	85
New Hampshire	21				11	19		1			37				[13] 5			4	34
Vermont	10				20	1								1			2	2	92
Massachusetts	133				450	7		2		13	816	767		11	16		11		598
Rhode Island	6		45		36	14				2	166	152		1	2		2	1	25
Connecticut	84				67	61		3		1	447	424		4	[13] 3		25		94
MIDDLE ATLANTIC																			
New York	891			19	[14] 513			7		52	3 510	3, 270		25	[13] 24	5	58		1, 429
New Jersey	540			3	115	18		5		10	755			11	2	1	12		713
Pennsylvania	475		224	6	396			1		7	1 254		1	69	[13] 7		27		890
EAST NORTH CENTRAL																			
Ohio	863		26	5	566	1	1	10		4			3	44	7		44	2	862
Indiana	258		4	7	123	12		5	3		793	747	1	25	2		15	5	144
Illinois	745		22	11	294	18		12	4	7	2, 044	1 908	7	29	6		147	29	500
Michigan	488		106		328	44		19		2	1 602		1	15	[13] 37		55		402
Wisconsin	386			1	132	5					695			3			85		496
WEST NORTH CENTRAL																			
Minnesota	840		16	1	119	20		2			738		1	11	[13] 53		53		105
Iowa	583			3	63	8				1	214		4	3	1		186		88
Missouri	195		2	8	62	3	1	10	348		557		26	33	1		17	1	89
North Dakota	93				29		1				89	86		3	2		3	12	45
South Dakota	200			2	10				5		47						23		12
Nebraska	494		5		81		1		1	1	148			2			28		78
Kansas	222		1	3	73	1		3			293	285	2	7	1		42	9	202
SOUTH ATLANTIC																			
Delaware	114			1	5	1					131	131		3					7
Maryland	107		14	28	66	13		5			1 178	1 146		9	[13] 2	1	13	9	206
District of Columbia	118			4	61									9	2				61
Virginia	399		1	35	77	567		3			1 087	1 066	16	39	9	1	22		409
West Virginia	122			8	85	9					559	557	2	24	2		3		126
North Carolina	1, 906			56	132	7					813	775	6	23	3	13	6		494
South Carolina	280		80	3	29	1 670		1			90		4	41	1	11	1		682
Georgia	161		17	20	101	48		19			852	842	13	57	21	97	39	15	124
Florida	150				32	19		18	35		769		4	22	[13] 29	42	13	22	130

EAST SOUTH CENTRAL																			
Kentucky	138	1	10	11	144	7	2		29		548	538	1	74	4	8	10	7	161
Tennessee	256	2	6	29	195	128		15		1	1 582		10	56	2	6	23	79	289
Alabama	138			11	89			14			827		3	24		76	36		183
Mississippi	119	2	10		46		2	3	1		991	966	4	16	3	13	25	—	28
WEST SOUTH CENTRAL																			
Arkansas	106	1	2	1	[8] 60	372		5	34		727	715	63	55	2	3	11		180
Louisiana	80	1	11	2	17	6		15			904	870	1	47	6	20	12		38
Oklahoma	279			14	63	28	1	2	50		632	616	22	27	[13] 3	1	26		127
Texas	876	1		1	119	1 155			47		2, 800		17	125	11	118	186		1, 443
MOUNTAIN																			
Montana	32			2	41	11			18	1	208	206	5	2	1		1	2	64
Idaho	47		10	1	19	40					74		1	4	8		9	9	45
Wyoming	62		2	1	8			1			15	3	16				2		33
Colorado	85		32	4	58	238					485		3	17	11		70	11	210
New Mexico	54		11	1	26	5		1	7		[8] 454	[8] 443		7			2		82
Arizona	103		14		11	12			155		539	521		12			1		101
Utah	51		19	2	12			1			[6] 33	[8] 32	[8] 23				[8] 17		[8] 153
Nevada	9		1	1	1	13			3		10						1	5	11
PACIFIC																			
Washington	165		76		129	6					360		2	4	[12] 8		12	28	92
Oregon	91		18	2	63	37					194	179	1	5	1		6		275
California	3 074		112	1	424	55		23	4	-	2, 286	2, 143	4	48	43	7	41		634
Total	16, 678	8	899	308	5 659	4, 673	9	206	744	114	33 484	19 511	267	1 054	341	423	1 423	254	18, 114
Third quarter 1947	6, 235	9	842	324	6, 311	4 198	9	167	263	89	35, 183	18, 076	332	1 216	[13] 375	612	1 873	459	45 051
Median 1943–47	5 786	9	[11] 841	266	11 912	1 754	38	151	372	66	29, 908	17 688	208	1 809	353	1 770	1 301	544	34, 371
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Hawaii Territory			8		2	15		3			190	175		1	1	5			84
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PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Murine Typhus Fever in Louisville, Kentucky

By Newell E. Good,[1] Ph. D, and Emil Kotcher,[2] Sc. D.

The distribution and extension of murine typhus fever have been studied and reported on by Maxcy (*1*), Meleney (*2*), Topping and Dyer (*3*), and others. From these investigations, the following conclusions are accepted generally:

1. The oriental rat flea, *Xenopsylla cheopis*, is the principal vector and the brown rat, *Rattus norvegicus*, the principal vertebrate reservoir of *Rickettsia mooseri*, the causative agent of murine typhus fever.
2. In the United States the disease is endemic principally in the Southern States. Foci of infection have been found in cities on the Atlantic Seaboard and in southern California.
3. The disease is principally an urban disease, but a considerable number of cases also occur in rural areas where the economy supports readily the rodent reservoir.
4. Railroads, transport trucks, and river boats have been means by which rats and fleas have been transported from foci of infection into new, uninfected areas.
5. While the disease is most frequently reported from the Southern States, in recent years there appears to have been an extension of the infected area into more northerly States. Murine typhus has been reported from 37 States and the District of Columbia during the past 5 years, Wiley (*4*). In recent years autochthonous cases of murine typhus have been reported from such inland cities as East Cleveland and Cincinnati, Ohio; St. Louis, Mo.; and Des Moines, Iowa. This may be due in part to better recognition of the disease by the physicians of these new areas.

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With these conclusions in mind, the questions of whether murine typhus fever had reached Louisville and whether it was going by unrecognized were raised by the clinicians and the personnel of the local Board of Health. It was difficult to believe that Louisville could be free of the disease in view of the following facts:

1. The city is connected by railroad with known foci of marked endemicity. (The Louisville & Nashville Railroad comes up from New Orleans, Mobile, Montgomery, Birmingham, and Nashville. The Southern Railroad has lines from Savannah, Atlanta, and Chattanooga. The Illinois Central Railroad serves the city from such points as New Orleans; Jackson, Miss.; and Memphis. The Chesapeake and Ohio Railroad comes in from Washington, D. C., and the Baltimore and Ohio Railroad from Baltimore, Md.)
2. The city is served by several excellent highways coming from endemic foci in the South and the East.
3. The city is a port on the Ohio River with considerable river traffic from such points as New Orleans, Natchez, Vicksburg, and Memphis.
4. The rat population is rather large and the presence of the flea vector seemed likely, although no actual survey for its presence had been made.
5. The first case of murine typhus fever was reported in Nashville in 1936, and by 1939, 75 cases were reported in a year. In 1941, Bowling Green, Ky., 73 miles north of Nashville on the L. & N. Railroad, had its first reported case of the disease, and in the latter half of 1946 and first half of 1947 some 12 cases occurred in a small outbreak described by Harden (*5*). Louisville is only 114 miles north of Bowling Green on the L. & N. Railroad.

From October 16 through November 30, 1946, an intensive venereal disease case-finding project was conducted by the Louisville and Jefferson County Board of Health. Blood specimens were taken at five permanent clinics and one mobile unit and sent to a special laboratory for Kahn testing. Specimens from 7,777 individuals were processed in this survey. Since many of these were from areas with large rat populations, it seemed advisable to utilize the sera thus obtained to ascertain the proportion with murine typhus complement fixing antibodies. Through the cooperation of the Communicable Disease Center, 1,986 sera were examined by its virus laboratory in Montgomery, Ala. The following results were obtained from this survey:

Total number sera tested	1,986
Total number positive (1:4 or better)	42 (2.11%)
1:4	38 (1.91%)
1:8	3 (0.15%)
1:32	1 (0.05%)

While the type of murine typhus antigen used in performing these tests is not definitely known, it is probable that the soluble antigen was used in the majority of the tests which were made by the Bengston method. Because of the loss of a large percentage of the record slips, giving names and addresses of the individuals from whom the 1947 series of human sera was taken, it was possible to recheck only a few of the C–F positives in this series.

In view of the number of sera which showed a positive reaction, and with the knowledge that murine typhus was apparently spreading northward, the Louisville and Jefferson County Board of Health arranged with the Kentucky State Department of Health to cooperate in a joint survey to determine the typhus incidence among rats in Louisville. Subsequently, the decision was made to survey both the human and the rat populations of the city in order to determine the present status of the disease in the local area. The findings of this survey are the subject of this report.

Human Serological Studies

During the first half of 1948, another series of human sera obtained from the routine tests for syphilis was submitted by the Division of Bacteriology, Kentucky State Department of Health, to the Serology Unit of the Communicable Disease Center, for murine typhus complement fixation tests. The following results were received from this laboratory:

Total number sera tested	793
Total number positive (1:4 or better)	3 (0.38%)
1:4	3 (0.38%)

These three positive murine typhus sera gave negative tests for syphilis. The murine typhus antigen used in performing these tests was the soluble antigen purified by treatment with benzene and sodium sulfate. (Lederle Laboratories—Cox.)

The following data in regard to syphilis were available in the second series of sera:

	Syphilis			
	Total	Negative	Positive	Doubtful
Specimens positive for murine typhus	3	3	0	0
Specimens negative for murine typhus	790	748	36	6

An attempt was made to recheck all individuals reported positive during the tests in 1946 in order to see if any of them had had an illness during the past 10 years suggestive of murine typhus. Also obtained were other epidemiological data such as occupation, residence outside of Louisville during the past 10 years, etc. A second blood specimen was obtained from these individuals and submitted to the CDC Laboratory. The following results were obtained:

1. Of 7 people who were rechecked, the second complement fixation tests were negative though the time interval between the two tests was less than 18 months.
2. None of these 7 people gave histories of illness that were suggestive of murine typhus fever (high fever for about 2 weeks, rash over body and severe headache).
3. Four of the 7 individuals had lived for varying intervals in places other than Louisville where they may have been exposed to murine typhus.

Rat and Rat Ectoparasite Studies

Geographic Areas Studied

The area surveyed included the City of Louisville and some of its suburbs. Louisville is situated at 38° 15′ N. Lat. and 85° 45′ W. Long., at an average down-town elevation of 459 feet above sea level. The mean annual temperature is 57° F., and the normal annual rainfall is 42.5 inches. The normal mean monthly temperatures for the cold season months, November through March, are 46.5, 37.4, 34.4, 37.3, and 45.4° F., respectively. The population of the city is approximately 350,000 and its area about 40 square miles.

For the purposes of this survey the city was divided into nine types of areas as follows: (A) the business district in the north central part of the city, comprising census tracts 49 and 47 south of Main Street; (B) the market district adjoining the business district in census tracts 48 and 58; (C) the northern industrial area near the Ohio River in census tracts 29, 47, 48, 57, 73, and 81; (D) the stock yards, flour and feed mills, and feed and poultry stores in the northeastern part of the city in census tracts 57, 60, 63, and 81; (E) the city dump near the river in the northeastern part of the city in census tracts 73 and 74; (F) the L&N Railroad yards and the central industrial area in census tracts 32, 35, and 54; (G) horse stables at Churchill Downs and the State Fair Grounds in census tracts 38 and 13; (H) poor residential areas west of the business district in census tracts 3, 19, 20, 22, 24, 25, 30, and 32; and (I) other residential areas including small shopping districts in the south and east parts of the city in census tracts 40, 41, 52, 53, 76, 79, and J-4.

Since the purpose of this survey was to establish the presence or absence of murine typhus infection and not primarily to make a rat or rat ectoparasite survey, there was no uniform coverage of the city. Nearly one-half of the total number of rats were taken in the business and market districts. Likewise, it was continued for only 12 weeks so there was no attempt to obtain data in regard to seasonal variations.

Species of Rats in Louisville

Trapping operations were started February 16 and continued through May 7. The extent of trapping during this period totaled 4,896 trap nights. Three hundred seventy-five live rats and 127 dead rats were trapped and 17 live rats were caught by hand.

Table 1. *Habitat and sex ratio of rats caught*

Area	Habitat			Sex		
	Buildings	Sheds	Outside	Male	Female	Immature
A	3	2	112	68	47	2
B	25	0	34	27	31	1
C	7	6	43	27	28	1
D	4	13	25	24	18	0
E	0	0	23	9	14	0
F	10	2	7	7	12	0
G	1	9	2	7	5	0
H	2	0	42	21	23	0
I	1	0	19	9	11	0
Total	53	32	307	199	189	4

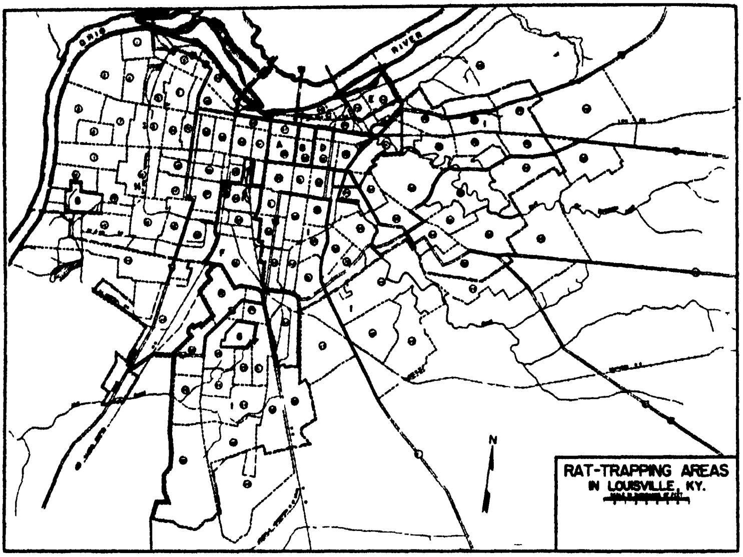
All rats taken proved to be *Rattus norvegicus*. Of the 53 rats caught in buildings, four were taken on the second floor in the market and industrial areas where *R. rattus* would ordinarily be found, if present in the city. Although this does not prove that there are no *R. rattus* in Louisville, the indications are that this species, if present, is not common in this area.

Observations made during this survey on the abundance of rats in Louisville would indicate that *R. norvegicus* are at least as numerous here as in other cities of comparable size in southeastern United States. Factors contributing to the abundance of rats here are large quantities of accessible garbage, an abundance of outdoor shelters such as trash piles, and easy access to most buildings.

Murine Typhus in Rats

Rats were tested for typhus infection by bleeding, centrifuging the blood, and sending the sera to the CDC laboratory where a complement fixation test was made on each specimen. Sera were tested from 373 specimens, of which 22 were anticomplementary, 350 were negative, and one was positive for murine typhus in a titer of 1:8. The positive rat was taken near a small meat packing plant on Story Avenue in area C, census tract 73, about five blocks from the city dump and an equal distance from the stockyards. Eleven other rats taken from the same spot were negative.

It is felt that all sections of the city in which typhus infection



Map of Louisville, showing area boundaries. The dot in area C indicates the site where serologically positive rat was trapped.

might normally be expected to appear were surveyed and that special attention was given to areas where there is the greatest danger of typhus introduction and spread. Rats were caught in 29 census tracts and in 82 blocks.

Rat Ectoparasites

A total of 3,473 ectoparasites was found on the 392 live rats caught and examined. From 1 to 384 ectoparasites were found on 329 of the rats while 63 rats were entirely free of ectoparasites. The number of each species and the number of rats infested were as follows:

		Specimens	*Rats Infested*
Fleas	*Xenopsylla cheopis*	135	55
	Nosopsyllus fasciatus	187	63
Mites	*Liponyssus bacoti*	167	41
	Atricholaelaps glasgowi	*396	57
	Echinolaelaps echidninus	69	24
	Other species of mites	7	6
Lice (*Polyplax spinulosa*		2,512	281

*287 *A. glasgowi* were found on one rat.

The limited period during which the survey was conducted, from February 16 to May 7, precluded any study of seasonal variations in the abundance of the different species of ectoparasites. The monthly catch of live rats was 98 in February, 206 in March, 71 in April, and

17 during the first 7 days of May. However, since ectoparasite counts in southeastern United States indicate that the *X. cheopis* index normally is from three to four times greater during the months of June through September than during February, March, and April, it is probable that the *X. cheopis* index in Louisville is much higher during the summer months than indicated by the figures given here.

There was a marked difference in flea indices, depending on whether the rats were trapped in buildings or out-of-doors. Rats trapped in buildings averaged 4 to 5 times as many fleas, both *X. cheopis* and *N. fasciatus*, as those caught out-of-doors. Those taken in dirt-floored sheds and barns had few fleas and this group was considered separately from those taken in larger buildings. The actual indices are:

	In Buildings	*In Sheds*	*Out-of-Doors*
X. cheopis	1.02	0.00	0.26
N. fasciatus	1.57	0.19	0.32

An analysis of the ectoparasite indices and percent of rats infested by type of area and location in the city shows marked differences in the occurrence of *X. cheopis* and less significant variations in the distribution of the other ectoparasites. The market and business districts showed an *X. cheopis* index of 0.72 and an infestation of 27 percent of the rats examined, while the remainder of the city gave an *X. cheopis* index of only 0.04 and an infestation of only 3 percent of the rats examined. *N. fasciatus* was more generally distributed but was more numerous in the industrial areas than in other sections.

Table 2 shows the infestation by the different species of ectoparasites of rats taken in various types of areas in Louisville.

Summary and Conclusions

1. On the basis of this and the earlier human serological surveys, it appears that there have probably been very few cases, if any, of murine typhus which originated in Louisville. While it is probable that the clinicians might fail to recognize clinical cases, in view of the demonstrated low incidence of this disease, missed diagnosis is not the chief reason for the lack of reported cases of murine typhus.

2. On the basis of the rat survey, it appears that the infection rate in the rat population is very low at present. From the epidemiological studies of Eskey and Hemphill (*6*) it appears probable that the low winter temperatures of Louisville operate to prevent the establishment and perpetuation of murine typhus in the rat population.

3. The rat ectoparasite survey showed that the oriental rat flea, *Xenopsylla cheopis*, the principal vector of murine typhus rickettsiae, is present in sufficient numbers to transmit the infectious agent to man and rats.

Table 2. *Ectoparasite infestation of rats caught in Louisville, Ky.*

Area[1]	Dates rats caught (1948)	Number of live rats	FLEAS				MITES[2]						LICE		Total[2] ectoparasites	
			X. cheopis		*N. fasciatus*		*L. bacoti*		*A. glasgowi*		*E. echidninus*		*P. spinulosa*			
			Index	Rats infested	Index	Rats infested	Index	Rats infested	Index	Rats infested	Index	Rats infested	Index	Rats infested	Index	Rats infested
				Percent		*Percent*		*Percent*		*Percent*		*Percent*		*Percent*		*Percent*
A	2/18–3/4	117	0.63	28	0.20	8	0.86	21	[3] 0.58	18	0.07	3	[3] 5.82	61	[3] 8.36	79
B	3/5–3/13	59	.88	27	.37	3	.29	8	.05	2	.30	8	4.40	76	6.30	83
C	3/2–5/6	56	.09	5	1.03	20	.55	4	.70	14	.00	0	[3] 7.41	80	9.80	86
D	3/18–4/1	42	.05	5	.45	29	.14	2	.80	21	.09	2	6.95	83	8.21	96
E	3/19–5/7	23	.00	0	.00	0	.00	0	.09	9	1.61	57	2.65	74	4.38	83
F	3/26–4/20	19	.05	5	1.10	26	.16	10	1.32	16	.00	0	2.73	68	5.57	84
G	4/6–4/9	12	.00	0	.17	8	.25	17	.42	8	.17	8	1.25	67	2.26	83
H	3/23–4/14	44	.00	0	.52	34	.04	5	.30	11	.00	0	4.10	73	4.97	84
I	2/20–4/29	20	.05	5	.40	15	.20	15	.65	30	.00	0	3.60	80	5.00	90
Total or average	2/18–5/7	392	.34	14.0	.48	16.1	.43	10.5	[3] .48	14.5	.18	6.1	[3] 5.17	71.7	[3] 7.10	83.9

[1] Type of area, location, and city census tracts are explained on page 232.

[2] Seven miscellaneous mites are not listed under "Mites" but are included under "Total ectoparasites." This includes two from area I and one each from areas A, C, D, E, and H.

[3] In computation of the ectoparasites indices, specific ectoparasite counts were held to a maximum of 60 for lice and 30 for fleas and mites. This reduced the total number of *P. spinulosa* by 378 in area A, and 106 in area C, and of *A. glasgowi* by 207 in area A. No more than 30 ectoparasites of any other species were found on one rat.

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Twenty-five Year Survival of a *Pasteurella pestis* Culture Without Transfer

By Edward Francis, M. D.*

Observations have been recorded of 10-year survival of a culture of *Pasteurella pestis*, without transfer, by Wilson (*1*); of 9-year survival of viability and virulence of a culture, without transfer, by Francis (*2*); and of 20-year survival of virulent cultures without transfer, by Francis (*3*). Twenty-five year survival of viability and virulence of a culture, without transfer, is reported in the present paper.

The studies were carried out at the National Institutes of Health with a culture of *Pasteurella pestis* P4–7 received December 11, 1922, from the Public Health Service plague laboratory in San Francisco where it had been isolated from a California ground squirrel (*Citellus beecheyi*) shot in California in the antiplague campaign.

In June 1923, the culture P4–7 was found to be highly virulent for guinea pigs and white rats. Heart blood of the guinea pigs was cultured by transfer of a few infected drops of blood to slants of plain beef infusion agar, and the resultant growth was subcultured on the same medium until a collection of 48 infected tubes had accumulated. Some of these still bore a few drops of the infected guinea pig blood used as inoculum, but other subcultures were free from any blood. The resultant collection of cultures of P4–7, all planted in 1923 and numbered 1 to 48, is the basic material on which the author has made viability and virulence tests after 10, 20, and 25 years of storage at 5° to 10° C., without transfer.

20-Year Survival Without Transfer

In 1943, each of the 48 numbered tubes in the 1923 collection was carried over to a correspondingly numbered fresh slant of plain horse-meat infusion agar. The inoculum to each tube consisted of a platinum loopful of undiluted 1923 solid growth. In this 20-year test, 33 of 48 numbers grew luxuriantly in 2 to 7 days, but 15 failed to grow and were discarded along with their correspondingly numbered tubes in the parent 1923 collection.

Virulence tests were made of each of the 33 living subcultures by injecting subcutaneously a loopful of solid growth on the abdomen of a separate guinea pig, with the result that 22 of 33 pigs died of acute plague by the end of the first week and 11 survived to the end of 2 weeks, when they were killed without showing plague lesions.

From the Laboratory of Infectious Diseases, Microbiological Institute, National Institutes of Health, Bethesda, Md.

* Medical Director (Retired), Public Health Service.

25-Year Survival Without Transfer

Of the 48 original cork-stoppered tubes inoculated in 1923, and maintained at 5° to 10° C. without transfer, 33 survived for the 25-year test of viability in 1948. The latter were transplanted August 25, 1948, each to a fresh cotton-stoppered slant of horse-meat infusion agar and incubated at room temperature with the result that 25 of the 33 transplants grew promptly and luxuriantly in 2 to 8 days, but 8 failed to grow. The latter 8 were discarded together with their correspondingly numbered 1923 parent tubes, leaving 25 living transplants of the 1923 cultures to be tested for virulence in 1948.

Virulence testing of the 25 viable transplants of the 25-year-old cultures consisted of subcutaneous injection of a guinea pig on the abdomen with a platinum loopful of undiluted fresh culture growth collected from the surface of each week-old agar slant. Twenty-five guinea pigs thus inoculated became noticeably sick in 2 to 4 days, but all, except three which died, gradually recovered by the end of 2 weeks. No. 31 died on the 7th day, No. 33 died on the 6th day, and No. 37 died on the 8th day after inoculation.

The three guinea pigs that died manifested the typical lesions of acute plague—edematous swelling and hemorrhagic injection at the site of inoculation, enlarged softened caseous inguinal lymph nodes, and areas of focal necrosis in the enlarged spleen. Smears of these tissues showed great numbers of typical bipolar bacilli when stained with Wayson's stain (*4*), and the spleen yielded typical cultures of *P. pestis*.

Fermentation of Sugars

The one plague strain P4–7 was employed throughout these studies of 1923, 1932, 1943, and 1948, during which time its sugar reactions remained constant. All tests were made in straight tubes containing the semisolid medium proposed by Enlows (*5*), which is composed of water, peptone, potassium and sodium salts, agar 0.15 percent, brom thymol blue as an indicator, and the fermentable substance.

The fermentation reactions noted for the three tubes 33, 37, and 39 in 1948 were as follows: (1) Fermentation with production of acid but no gas in dextrose, levulose, mannose, mannitol, xylose, trehalose, salicin, maltose, galactose, and arabinose; (2) no fermentation of saccharose, lactose, amygdalin, dulcitol, erythritol, inositol, inulin, raffinose, rhamnose, sorbitol, adonitol, dextrine, starch, litmus milk, or glycerol.

All students of plague cultures have emphasized the importance of low temperature and the presence of moisture for the long preservation of viability and virulence. Incubation at 37° C. and the temperature of the tropics rapidly shorten the length of life and virulence of plague cultures and should be avoided.

In the present studies care was exercised to use agar slants liberally supplied with water of condensation. Cotton stoppers were used only during the few days of incubation at room temperature and were then replaced by cork stoppers grasped by mouse-tooth forceps and forcibly introduced after being dipped into a boiling mixture of half paraffin and half vaseline.

This provided a tight-fitting stopper which excluded air and prevented any evaporation of the water of condensation. Such tubes stored upright in a cold room at 5° to 10° C. and opened only three times in 25 years still maintained approximately their original amount of water of condensation.

Future Tests

The present remainder of the 1923 collection of cultures now consists of 25 numbered tubes stored in the cold room to await tests in future years. Another collection of 40 cork-stoppered cultures numbered 49 to 88 prepared in 1924 from plague strain P4–7 and identical with the 1923 collection except that they have not been opened since 1924 are stored in the cold room at 5° to 10° C. awaiting tests for viability and virulence in later years.

ACKNOWLEDGMENT

The author is indebted to Surgeon Carl L. Larson for making the virulence tests on guinea pigs of cultures which had survived 25 years.

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(*4*) Brown, T. McP. and Nunemaker, J. C.: Rat-bite fever: A review of the American cases with reevaluation of etiology; report of cases Bull. Johns Hopkins Hospital 70: 201–327 (1942) (for formula see page 282).
(*5*) Enlows, E. M. A.: A sugar-free medium for fermentation studies. Pub. Health Rep. 38: 2120–2132 (1923).

Communities Awarded Milk Sanitation Ratings of 90 Percent or More During 1947 and 1948

Prior to World War II, communities which achieved a compliance rating of 90 percent or more under the milk ordinance recommended by the Public Health Service were listed semiannually in Public Health Reports. Owing to the war time deterioration in milk quality resulting from labor and equipment shortages, as well as from reduction in local milk control staffs, publication of these lists was suspended after the issue of February 19, 1943. At the request of health departments which have succeeded in restoring the quality of their milk supplies, publication of these lists, though much smaller than formerly, is resumed.

Listed in the table are all Public Health Service milk ordinance communities which were reported by State milk-sanitation authorities, during January 1, 1947 to December 31, 1948, as having a market milk rating of at least 90 percent. The inclusion of a community in this list means that if pasteurized milk is sold in the community, it is of such a degree of excellence that the weighted average of the percentages of compliance with the various items of sanitation required by the Public Health Service Milk Ordinance for grade A pasteurized milk is 90 percent or more, and that, similarly, if raw milk is sold in the community, it so nearly meets the standards that the weighted average of the percentages of compliance with the various items of sanitation required for grade A raw milk is 90 percent or more.

These ratings are not a complete measure of safety, but represent the degree of compliance with the grade A standards. High-grade pasteurized milk is safer than high-grade raw milk, because of the added protection of pasteurization. Safety estimates should take into account the percentage of milk pasteurized, which is given in the table. To obtain this added protection, those who are dependent on raw milk can pasteurize the milk at home in the following simple manner: Heat the milk over a hot flame to 165° F., stirring constantly, then immediately place the vessel in cold water and continue stirring until cool, changing the water when it warms up; however, if a dependable thermometer is not available, bring the milk to a boil instead.

The milk ordinance recommended by the Public Health Service is now in effect statewide in 10 States, as well as in 207 counties and 1,207 municipalities located in 39 States. It has been adopted as a regulation by 31 States and Territories.

The primary reason for publishing the rating lists is to encourage

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From Division of Sanitation, Milk and Food Branch.

these communities to attain and maintain a high level of excellence in the enforcement of the ordinance. No comparison with communities operating under other milk ordinances is intended or implied. Some communities which have high-grade milk supplies are not included because arrangements have not been made for the determination of their ratings by the State milk sanitation authority. In other cases the ratings which have been submitted are now more than 2 years old and have therefore lapsed. In still other communities with high-grade milk supplies there seems, in the opinion of the community, to be no local necessity nor desire for rating or inclusion in the list.

The rules under which a community is included in this list are as follows:

1. All ratings must be determined by the State milk-sanitation authority in accordance with the Public Health Service rating method[1] based upon the grade A pasteurized milk and the grade A raw milk requirements of the Public Health Service Milk Ordinance and Code. A recent departure from the method described consists of computing the pasteurized milk rating by weighting the plant rating twice as much as the rating of the raw milk for pasteurization.

2. No community will be included in the list unless both its pasteurized milk and its raw milk ratings are 90 percent or more. Communities in which only raw milk is sold will be included if the raw milk ratings are 90 percent or more.

3. The rating used will be the latest rating submitted to the Public Health Service, but no rating will be used which is more than 2 years old. In order to promote continuous rigid enforcement rather than occasional "clean-up campaigns" it is suggested that when the rating of a community on the list falls below 90 percent no resurvey be made for at least 6 months, resulting in removal from the next semiannual list.

4. The Public Health Service will make occasional check surveys of cities for which ratings of 90 percent or more have been reported by the State. If such check rating is less than 90 percent but not less than 85, the city will be removed from the 90-percent list after 6 months unless a resurvey submitted by the State during this probationary interim shows a rating of 90 percent or more. If, however, such check rating is less than 85 percent, the city will be removed from the list immediately. If the check rating is 90 percent or more, the city will be retained on the list for a period of 2 years from the date of the check survey unless a subsequent rating submitted during this period warrants its removal.

Communities which are now on the list should not permit their ratings to lapse, as ratings more than 2 years old cannot be used.

State milk-sanitation authorities who are not now equipped to determine municipal ratings are urged, in fairness to their communities, to equip themselves as soon as possible. The personnel required is small; in most States one milk specialist is sufficient for this work.

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[1] Pub. [illegible] Rep. 53: 1396 (1938). Reprint No. 1970.

Communities Awarded Milk Sanitation Ratings of 90 Percent or More

1947–48

Community	Percent of milk pasteurized	Date of rating	Community	Percent of milk pasteurized	Date of rating
ALL MARKET MILK PASTEURIZED					
FLORIDA			OKLAHOMA		
Panama City	100	Sept. 18, 1948	Seminole	100	May 5, 1948
Pensacola	100	Dec. 12, 1947	Sulphur	100	July 30, 1948
GEORGIA			TENNESSEE		
Atlanta	100	Apr. 24, 1948	Athens and McMinn County	100	Dec. 2, 1947
Columbus	100	June 25, 1948	Clinton	100	May 25, 1948
Quitman	100	Aug. 25, 1948	Greenville	100	Dec. 5, 1947
			Maryville-Alcoa	100	Aug. 31, 1948
ILLINOIS			Morristown	100	Dec. 4, 1947
Champaign-Urbana	100	Aug. 18, 1948	TEXAS		
Chicago	100	Sept. 24, 1947	Houston	100	Dec. 3, 1948
East Peoria	100	July 31, 1947	Pampa	100	May 24, 1948
			San Antonio	100	June 21, 1948
KENTUCKY			Tyler	100	Mar. 31, 1948
Bowling Green	100	Dec. 1, 1947	VIRGINIA		
			Richmond	100	May 1948
			Suffolk	100	Apr. 1948
BOTH RAW AND PASTEURIZED MARKET MILK					
FLORIDA			TENNESSEE		
Madison	62.5	Sept. 25, 1947	Bristol	99	Dec. 10, 1947
GEORGIA			Elizabethton	99	May 24, 1948
			Johnson City and Washington County	96	Dec. 6, 1947
Macon	96.6	June 4, 1948	Kingsport	99	Dec. 11, 1947
Thomasville	81.5	July 28, 1948	Knoxville	99	Dec. 12, 1947
Tifton	92	Apr. 15, 1948	TEXAS		
NORTH CAROLINA			Fort Worth	99.9	Mar. 8, 1948
Greensboro	96	July 1947	Lubbock	98	Sept. 27, 1947
			Wichita Falls	99	Mar. 29, 1948
OKLAHOMA			VIRGINIA		
Lawton	92	June 30, 1948	Abingdon	75	Dec. 10, 1947
Muskogee	88	Apr. 2, 1948	Bristol	99	Dec. 10, 1947
Shawnee	96	June 3, 1948	Emporia	26	Jan. 1948

NOTE. In these communities the pasteurized market milk shows a 90 percent or more compliance with the grade A pasteurized milk requirements and the raw market milk shows a 90 percent or more compliance with the grade A raw milk requirements of the Public Health Service Milk Ordinance and Code.

Note particularly the percentages of milk pasteurized in the various communities listed. This percentage is an important factor to consider in estimating the safety of a city's milk supply. All milk should be pasteurized or boiled, either commercially or at home, before it is consumed. See text for home method.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 5, 1949

The net seasonal increase of 2,419 cases in the reported incidence of measles (current week total 17,685, last week 15,266, 5-year median 7,997) is widely distributed, increases being reported in all geographic divisions (the largest in the Middle Atlantic and New England areas) except the East South Central and Mountain. States reporting the largest numbers are as follows (last week's figures in parentheses): Massachusetts 1,391 (1,171), New York 1,315 (993), Pennsylvania 1,402 (1,145), Wisconsin 721 (583), Kansas 507 (286), Maryland 1,127 (774), Virginia 827 (815), Texas 2,456 (2,086), Oregon 681 (474), California 655 (890).

Of the total of 5,170 cases of influenza reported for the current week (last week 4,534, 5-year median 12,896), 3,894 cases occurred in 3 States, as follows (last week's figures in parentheses): Virginia 437 (464), South Carolina 663 (625), and Texas 2,794 (2,327). These 3 States have reported 17,218 (76 percent) of the total of 22,511 cases reported for the year to date. For the same period last year they reported 34,682 (58 percent) of the total of 59,531 cases reported for the corresponding 5 weeks of that year

Of 80 cases of poliomyelitis reported currently, 29 occurred in California, 6 in Texas, 5 in North Carolina, and 4 each in Kansas and Idaho.

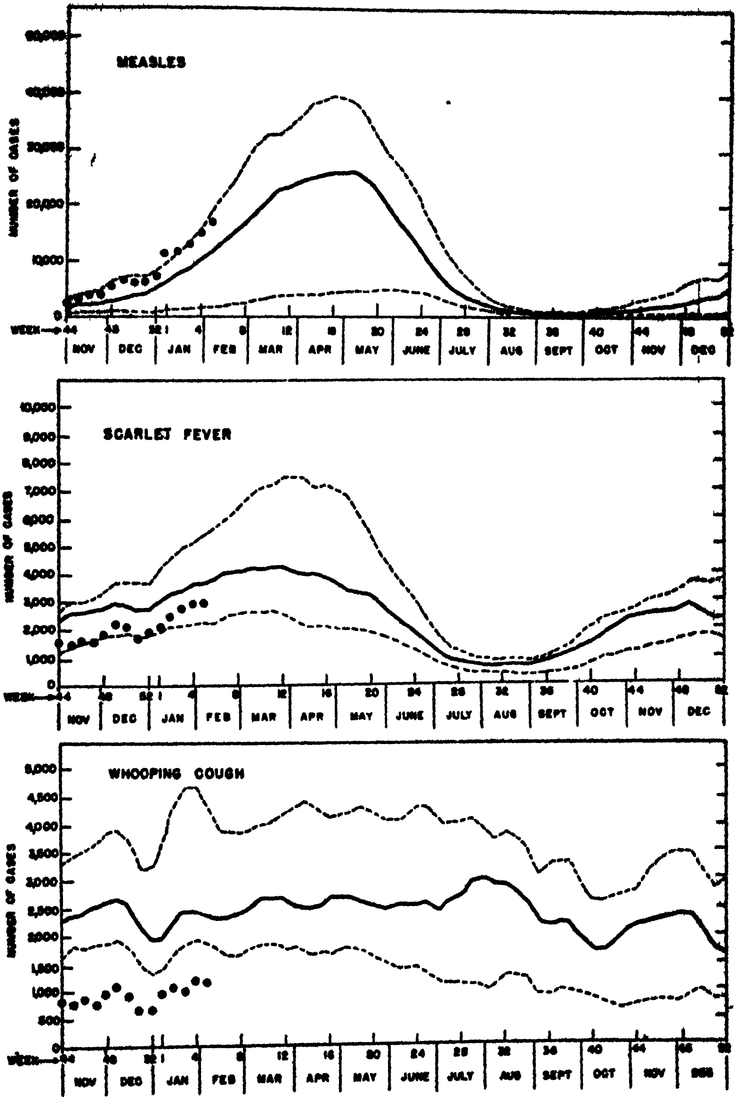
During the current week, Massachusetts, New York, and Pennsylvania each reported 1 case of anthrax, North Carolina 1 case of Rocky Mountain spotted fever, and Missouri 2 cases of smallpox.

For the first 5 weeks of the year, other cumulative figures above the respective 5-year medians are as follows (5-year median figures in parentheses): Infectious encephalitis 40 (36), Rocky Mountain spotted fever 8 (1), tularemia 175 (122).

Deaths recorded for the week in 94 large cities in the United States totaled 9,838, as compared with 9,518 last week, 10,772 and 9,692, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 10,259. The total for the year to date is 48,952, corresponding figure last year, 53,132. Infant deaths totaled 734, last week 635, 3-year median, 751. The cumulative figure is 3,479, same period last year, 3,667.

Communicable Disease Charts

All reporting States, November 1948 through February 5, 1949



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is a median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

Telegraphic case reports from State health officers for week ended February 5, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	---	---	---	486	---	7	---	---	27	---	---	---	4	---
New Hampshire	1	---	---	35	---	---	---	---	---	---	---	---	4	---
Vermont	---	---	---	353	---	---	---	---	15	---	---	---	10	---
Massachusetts	7	---	---	1,391	2	---	---	---	206	---	---	4	65	---
Rhode Island	---	1	---	233	---	5	---	---	[a] 4	---	---	---	---	---
Connecticut	2	---	27	385	1	40	1	---	69	---	---	---	8	---
MIDDLE ATLANTIC														
New York	9	3	([b])	1,315	15	308	---	---	[a] 260	---	---	---	160	2
New Jersey	2	---	3	453	2	116	---	---	128	---	---	---	39	5
Pennsylvania	18	1	([b])	1,402	11	---	1	---	280	---	---	4	76	1
EAST NORTH CENTRAL														
Ohio	6	---	1	46	2	37	1	---	209	---	---	4	60	17
Indiana	11	---	27	94	1	35	1	---	106	---	1	---	41	17
Illinois	1	---	2	58	2	108	1	---	182	---	2	---	38	4
Michigan [a] [e]	1	---	4	452	3	54	1	---	289	---	---	1	40	1
Wisconsin	2	---	71	721	2	15	---	---	70	60	---	---	40	---
WEST NORTH CENTRAL														
Minnesota	2	---	---	46	1	3	3	---	91	---	---	---	---	---
Iowa	---	---	---	15	1	5	---	---	58	---	---	---	5	3
Missouri	2	---	6	395	1	32	---	---	25	2	2	---	4	---
North Dakota	---	---	9	56	---	---	1	---	5	---	---	---	10	---
South Dakota	---	---	---	21	1	---	1	---	9	---	---	---	---	---
Nebraska	1	---	6	29	---	3	3	---	11	---	---	---	---	---
Kansas	5	---	2	507	1	22	4	---	38	---	---	---	5	---
SOUTH ATLANTIC														
Delaware	1	---	---	6	---	---	---	---	20	---	---	---	1	---
Maryland [a]	3	---	2	1,127	1	42	2	---	29	---	---	1	13	---
District of Columbia	---	---	---	58	2	23	---	---	7	---	---	---	6	---
Virginia	4	1	447	827	4	161	1	---	19	---	---	3	25	1
West Virginia	2	---	26	97	2	7	2	---	19	---	---	---	17	---
North Carolina	7	1	---	266	---	---	5	1	24	---	2	3	45	---
South Carolina	1	---	663	72	---	196	---	---	12	---	5	1	29	5
Georgia	3	---	16	120	1	24	1	---	18	---	6	1	2	18
Florida	3	---	4	71	1	27	---	---	11	---	---	2	5	1

EAST SOUTH CENTRAL														
Kentucky	6	1	4	177	2	13			57			6	89	26
Tennessee	7		92	165	3	57	1		49		3	1	10	
Alabama	4		79	493		58	1		18				2	9
Mississippi [a]	7		22	20	1	37	2		3		1	2	5	
WEST SOUTH CENTRAL														
Arkansas	5		155	338		118			4			1	16	3
Louisiana	3		4	215	2	69	3		16		3	5	2	
Oklahoma	1		110	139	1	59			13		2		12	5
Texas	13		2,794	2,456	4	585	6		26		1	4	150	9
MOUNTAIN														
Montana			31	91		3			33		1		1	
Idaho			4	57	1	10	4		12					
Wyoming				25					4		1	1	1	
Colorado	2		100	147	2	40			20				9	
New Mexico			2	150		33	1		4			1		
Arizona	6		191	134	1	40	2		4			1	10	
Utah [a]	3			99		13			8		1		5	
Nevada				1										
PACIFIC														
Washington	1		232	430	1	6	2		68				16	
Oregon	2		30	681	2	61			13				26	
California	6	3	15	655	8	34	29		108			3	82	3
Total	160	11	5,170	17,685	85	2,509	80	1	2,971	[1] 2	30	48	1,164	
Median, 1944-48	302	10	12,896	7,997	211		38		3,216	6	18	53	2,289	
Year to date 5 weeks	935	40	22,511	69,293	435	10,997	574	8	13,206	[1] 2	175	196	5,372	
Median, 1944-48	1,579	36	59,531	28,282	1,120		194	1	14,155	35	122	219	11,388	
Seasonal low week ends (1948)	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week ends	6,049		58,781	121,686	1,279		27,901		35,904	[1] 17		3,315	15,406	
Median, 1943-48	9,145		103,089	54,406	2,624		13,585		82,726	111		4,456	36,460	

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[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever, currently reported separately, as follows: North Carolina 2; Louisiana 1; Texas 1; Wyoming 1; salmonella infections, not included, were reported as follows: Massachusetts 1.

Anthrax: Massachusetts 1; New York 1; Pennsylvania 1.

[1] Correction: Smallpox, Wisconsin week ended January 8, no cases (instead of 1) (diagnosis changed).

Alaska: Measles 5; streptococcal throat 19.

Territory of Hawaii: Diphtheria 1; influenza 81; measles 431; lobar pneumonia 3; whooping cough 6.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases.—November 1948.—During the month of November 1948, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	6		5		3		1		15	
Dysentery:										
Amebic	1		2		2		1		6	
Bacillary	1				11		1		13	
Encephalitis (unspecified)								1		1
Hepatitis, infectious					1		2		3	
Malaria [2]	6		2		8		125		141	
Measles	2				1		2		5	
Meningitis (unspecified)			3	1					3	1
Mumps	1		2		5		1		9	
Pneumonia		12		1	24			3	[3] 24	16
Poliomyelitis					1				1	
Tuberculosis		20		5	3			6	[3] 3	31
Typhoid fever							1		1	
Undulant fever							1		1	
Yaws	5						2		7	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 3 recurrent cases.
[3] Reported in the Canal Zone only.

Puerto Rico

Notifiable diseases.—4 weeks ended January 29, 1949.—During the 4 weeks ended January 29, 1949, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	28	Syphilis	125
Diphtheria	37	Tetanus	6
Dysentery	4	Tetanus, infantile	2
Gonorrhea	237	Tuberculosis (all forms)	318
Influenza	40	Typhoid fever	29
Malaria	81	Whooping cough	185
Measles	75		

FOREIGN REPORTS

AUSTRALIA

Measles.—An epidemic of measles was reported in South Australia during the period September 25, 1948 to January 4, 1949. The peak of the outbreak apparently was reached during the first two weeks of November, when 1,859 cases were reported The total number of cases reported up to January 4, 1949, was 7,091.

CANADA

Provinces—Communicable diseases—Week ended January 15, 1949.—During the week ended January 15, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows.

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		54	2	227	979	56	130	160	374	1,982
Diphtheria				20	6	3		9	1	39
Dysentery, bacillary				1						1
German measles				40	13	3		11	8	75
Influenza		5			18	6			13	42
Measles		146	4	210	156	127	50	157	92	942
Meningitis, meningococcal					1	1	2			4
Mumps		32	3	115	354	73	60	24	55	716
Poliomyelitis				1				1	2	4
Scarlet fever		11	5	143	82	7	6	6	7	267
Tuberculosis (all forms)		9	13	99	40	19	7	19	42	248
Typhoid and paratyphoid fever			1	3					1	5
Undulant fever				1	2	1				4
Venereal diseases										
Gonorrhea		12	7	75	70	31	16	30	99	340
Syphilis		15	12	117	44	5	8	6	14	221
Other forms									1	1
Whooping cough		8	1	145	24	2	5	10		195

FINLAND

Notifiable diseases—November 1948.—During the month of November 1948, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	9	Poliomyelitis	10
Diphtheria	183	Scarlet fever	359
Dysentery	17	Syphilis	209
Gonorrhea	951	Typhoid fever	27
Paratyphoid fever	99		

JAPAN

Hepatitis.—Information dated January 19, 1949, states that 361 persons had been hospitalized in Tokyo with infectious hepatitis.

MADAGASCAR

Notifiable diseases—December 1948.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during December 1948 as follows:

Disease	December 1948			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri-beri	------	------	29	0
Bilharziasis	------	------	166	0
Cerebrospinal meningitis	------	------	13	6
Diphtheria	2	1	3	0
Dysentery:				
Amebic	14	1	317	2
Bacillary	1	0	8	1
Erysipelas	------	------	8	0
Influenza	14	0	2,245	19
Leprosy	------	------	34	0
Malaria	410	4	36,096	189
Measles	3	0	121	2
Mumps	------	------	143	0
Plague	------	------	21	19
Pneumonia, broncho	2	1	262	49
Pneumonia, pneumococcic	3	0	481	63
Puerperal infection	------	------	11	2
Relapsing fever	------	------	4	0
Tuberculosis, pulmonary	5	0	106	27
Typhoid fever	3	0	18	2
Whooping cough	2	0	210	4

MAURITIUS

Poliomyelitis.—During the recent outbreak of poliomyelitis in Mauritius a total of 192 cases with 5 fatalities had been reported up to December 31, 1948. Cases were stated to have occurred in 10 different localities, with indications of spread from Port Louis, which reported the greatest number of cases in the early stages of the epidemic. The latest reports are as follows: Week ended January 8, 1949, 82 (new) cases; week ended January 15, 80 cases; week ended January 22, 51 cases.

NEW ZEALAND

Notifiable diseases—4 weeks ended November 27, 1948 —During the 4 weeks ended November 27, 1948, certain notifiable diseases were reported in New Zealand as follows

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	7	1	Poliomyelitis	77	3
Diphtheria	8	1	Puerperal fever	10	
Dysentery			Scarlet fever	100	
Amebic	5		Tetanus	1	
Bacillary	6		Trachoma	2	
Encephalitis, lethargic	1	1	Tuberculosis (all forms)	159	39
Erysipelas	9		Typhoid fever	3	1
Food poisoning	3		Undulant fever	8	
Malaria	1				

NORWAY

Notifiable diseases—October 1948 —During the month of October 1948, cases of certain notifiable diseases were reported in Norway as follows

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	11	Mumps	391
Diphtheria	60	Paratyphoid fever	1
Dysentery unspecified	3	Pneumonia (all forms)	1 887
Encephalitis epidemic	1	Poliomyelitis	92
Erysipelas	458	Rheumatic fever	109
Gastroenteritis	2 636	Scabies	3 132
Gonorrhea	441	Scarlet fever	826
Hepatitis epidemic	203	Syphilis	137
Impetigo contagiosa	3 936	Tuberculosis (all forms)	322
Influenza	3 364	Typhoid fever	4
Laryngitis	10 037	Undulant fever	1
Measles	2 023	Whooping cough	789

INFLUENZA IN EUROPE

Information received from the World Health Organization for the week ended February 2, 1949, gives the following reports on the incidence of influenza in Europe There has been a moderate increase of seasonal catarrh in the American Zone of Germany, with localized influenza epidemics in Southwest Bavaria and Wurtenburg-Baden Small foyers exist in the French Zone of Germany with 30 percent of the population of the Saar Territory affected Belgium reports widespread incidence of the disease throughout the country Influenza has appeared in Finland in a mild form The epidemic is declining throughout France, but cases of a more serious clinical character are more frequent

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-November 1948	December 1948	January 1949—week ended—				
			1	8	15	22	29
AFRICA							
Egypt	1						
Cairo	1						
ASIA							
Burma[1]	46						
Akyab	5						
Bassein	1						
Moulmein	1						
Rangoon	2						
China.							
Hupeh Province	3						
Wuchang	3						
Kiangsi Province	[2] 9						
Kiangsu Province	2						
Shanghai	1						
India	167,086	6,685	2,247	[3] 1,238	[3] 369	[3] 218	
Ahmadabad	77						
Allahabad[1]	6						
Alleppey	1						
Bombay[1]	44	5					
Calcutta[1]	7,759	188	38	94	156	219	
Cawnpore	157						
Cocanada	15						
Colachel	12						
Cuddalore	36						
Jodhpur[1]	56						
Kilakarai	21						
Lucknow	48						
Madras	1,130	39	8	8	1		
Masulipatam	33						
Nagpur	71						
Negapatam	17		1	4	2	1	
New Delhi	26						
Raj Samand	6						
Tuticorin	16			4	5		
Vizagapatam	1						
India (French):							
Chandernagor	21						
Karikal	300				[4] 28		
Pondicherry	420				[4] 34		
Yanaon	2						
India (Portuguese)	29						
Indochina (French):							
Annam	[5] 45	[6] 4					
Cambodia	1,354	1					
Cochinchina	595						
Bien Hoa	1						
Chaudoc	2						
Cholon	29						
Giadinh	23						
Longxuyen	7						
Mytho	56						
Rachgia	133						
Saigon	136						
Laos	[7] 32						
Tonkin	20						

See footnotes at end of table.

CHOLERA—Continued

Place	January–November 1948	December 1948	January 1949—week ended— 1	8	15	22	29
ASIA—continued							
Pakistan	32,737	[3] 3,359	6	10	14	4	
Chittagong	41	5	6	10	14	4	
Karachi	4	3					
Lahore	406	9		1			
Siam	43	1					
Syria	3						

---

[1] Includes imported cases.
[2] Suspected.
[3] Preliminary figures.
[4] Jan. 1-15, 1949.
[5] Includes suspected cases.
[6] Deaths.
[7] Includes 12 deaths reported as cases in February 1948.
[8] 2 weeks, Nov. 28-Dec. 11, 1948.

PLAGUE

(Cases)

AFRICA							
Belgian Congo	20	1	2			2	
Costermansville Province	11		1				
Stanleyville Province	9	1	1			2	
British East Africa:							
Kenya	37	2					
Tanganyika	312	4					
Ethiopia	9						
Madagascar	395	21				1	
Tamatave	1						
Tananarive	33					1	
Rhodesia, Northern	34	24					
Union of South Africa	[2] 49	3					
ASIA							
Burma [3]	914	166	20	52	16		
Mandalay	18						
Rangoon	19						
China:							
Chekiang Province	41	2					
Wenchow	12	2					
Fukien Province	343						
Foochow	4						
Kiangsi Province	[4] 63	3					
Kwangtung Province	116						
Yunnan Province	149						
India	22,570	1,649	538	312	(5)	(5)	
Indochina (French):							
Annam	234	31	2				1
Cambodia	4		2				
Cochinchina	45						
Laos	3	2		1			
Mountain Area South-Indochina	23						
Java	[6] 2,460						
Pakistan	11						
Siam	126	7	2	7	1		
EUROPE							
Portugal: Azores	17						
SOUTH AMERICA							
Argentina	12						
Buenos Aires Province	9						
Brazil	125						
Alagoas State	22						
Bahia State	83						
Ceara State	11						
Pernambuco State	9						

See footnotes at end of table.

PLAGUE—Continued

Place	January-November 1948	December 1948	January 1949—week ended—				
			1	8	15	22	29
SOUTH AMERICA—continued							
Ecuador	40						
Chimborazo Province	1						
Loja Province	39						
Peru	49	9					
Cajamarca Department	11	2					
Lambayeque Department		4					
Libertad Department	1						
Lima Department	35	1					
Piura Department	2	2					
Venezuela:							
Aragua State	7						
OCEANIA							
Hawaii Territory: Plague-infected rats [7]	5						

[1] Pneumonic plague.
[2] Includes 4 cases of pneumonic plague.
[3] Includes imported cases.
[4] Includes suspected cases.
[5] Week ended Jan. 15, 1949, Calcutta 1 case; week ended Jan. 22, Calcutta 2 cases, Cawnpore 5 cases.
[6] Includes 1 case of pneumonic plague in Surabaya in September 1948.
[7] Plague infection was also reported in Hawaii Territory, under date of Feb. 27, 1948, in a mass inoculation of tissue from 19 rats.

SMALLPOX

(Cases—P=present)

Place	January-November 1948	December 1948	January 1949—week ended—				
			1	8	15	22	29
AFRICA							
Algeria	353	44			[1] 10		
Angola [3]	522	3					
Basutoland	3						
Bechuanaland	2						
Belgian Congo [3]	2,695	221	100	39	50		
British East Africa:							
Kenya	141	7					
Nyasaland	4,753	249	40	18			
Tanganyika [3]	1,208	17					
Uganda	211	4					
Cameroon (French) [3]	4	2					
Dahomey	474				[1] 3	[4] 8	
Egypt [3]	458	15	1	6			
Eritrea	9						
Ethiopia	25						
French Equatorial Africa	16						
French Guinea	136						
French West Africa: Haute-Volta	438	3			[1] 1		
Gambia	27						
Gold Coast	1,515						
Ivory Coast	768	65			[1] 6	[4] 12	
Libya	261	2					
Mauritania	2						
Mauritius	[6] 1						
Morocco (French)	36						
Mozambique	346	23					
Nigeria	4,085						
Niger Territory	390	22			[1] 2		
Rhodesia:							
Northern	1,343	672					
Southern	1,710						
Senegal	8				[1] 1		
Sierra Leone	196						
Sudan (Anglo-Egyptian) [3]	1,452	8	4	4	8	1	
Sudan (French)	17	4			[1] 1		
Swaziland	6						
Togo (British)	24						
Togo (French)	116	3			[1] 3		
Tunisia	542	1					
Union of South Africa	301	P	P	P			

See footnotes at end of table.

SMALLPOX—Continued

Place	January-November 1948	December 1948	January 1949—week ended— 1	8	15	22	29
ASIA							
Arabia	8						
Bahrein Islands					[4] 19	1	
British North Borneo	1						
Burma [3]	2,886	128	18	3	14		
Ceylon [3]	22						
China [3]	3,869	213			[1] 47		
India	59,481	1,164	537	349	504		
India (French)	6						
India (Portuguese)	187	5					
Indochina (French)	3,981	116	36	12	51	522	
Iran	990	165	11				
Iraq [3]	1,335	426	50	37	33	48	36
Japan	[7] 31						
Java [3]	2				66	P	
Lebanon [3]	67	75	37	24	26		
Macao Island: **Macao**	11						
Malay States (Federated) [3]	541	5					
Manchuria	78						
Pakistan [3]	12,081						
Palestine	8						
Philippine Islands: Mindoro Island	155	37					
Siam [3]	536	4	1	2	1		
Straits Settlements: **Singapore**	13						
Sumatra [3]	1,698						
Syria	[7] 534	353	11	25	24	18	
Transjordan [3]	16	36	3	9	16	9	
Turkey: **Izmir**	4						
(See also Turkey in Europe.)							
EUROPE							
France	3						
Germany	3						
Greece	4						
Italy [3]	11						
Portugal	78						
Spain	19						
Canary Islands	9						
Turkey	44	3	1	1	9	3	2
NORTH AMERICA							
British Honduras	3						
Guatemala	2						
Mexico	980			2			
SOUTH AMERICA							
Argentina	40	1	9				
Bolivia	31						
Brazil	405	9	12				
Chile	8						
Colombia	6,178	178					
Ecuador [2]	3,718	10	3	8			
Paraguay [2]	107	6					
Peru [2]	2,247						
Trinidad	[8] 12						
Venezuela [2]	4,488	92	24	60	51		

[1] Jan. 1-10, 1949.
[2] Includes alastrim.
[3] Includes imported cases.
[4] Jan 11-20, 1949.
[5] In Port Louis, imported.
[6] Jan. 1-15, 1949.
[7] Corrected figure.
[8] Alastrim.

TYPHUS FEVER[*]

(Cases)

(P=Present)

Place	January-November 1948	December 1948	January 1949—week ended—				
			1	8	15	22	29
AFRICA							
Algeria	195	7			5		
Basutoland	10						
Belgian Congo [1]	239	9			3		
British East Africa:							
Kenya [1]	71						
Zanzibar	1						
Egypt	365	8		2			
Eritrea	48			7			
Ethiopia	178						
French Equatorial Africa	1						
Gambia: Bathurst	1						
Gold Coast [1]	9	1					
Libya	495	5	2	2	2	3	
Madgascar: Tananarive	[3] 7						
Morocco (French)	82				2		
Morocco (International Zone)	5						
Morocco (Spanish) [1]	8						
Mozambique [1]	3						
Nigeria [1]	7						
Rhodesia (Southern)	[3] 1						
Senegal	[3] 4						
Sierra Leone	[3] 18						
Somalia	2						
Tunisia [1]	632	1			2		
Union of South Africa [1]	415	P		P	P		
ASIA							
Burma	5	1					
China [1]	196	6					
India	1	2			1		
India (Portuguese)	9	2					
Indochina (French) [1]	72	1					
Iran [1]	142	8					
Iraq [1]	211	9	1				2
Japan	[3] 450	37	7	8	6		
Java	3						
Malay States (Federated)		14					
Manchuria	38						
Pakistan	22						
Palestine [1]	12						
Philippine Islands [1]	[4] 5						
Straits Settlements: Singapore [1]	[5] 24						
Syria [1]	59	7					
Transjordan	67	3		2		2	
Turkey (see Turkey in Europe).							
EUROPE							
Albania	15						
Bulgaria	749	31					
Czechoslovakia	8						
France	5						
Germany:							
British Zone	8						
French Zone	12						
United States Zone	8	4					
Great Britain:							
Cyprus [3]	1						
England and Wales	[3 6] 2						
London	[3 6] 1						
Ireland (Northern)	[3] 2						
Malta [3]	27	2					
Greece [1 4]	332	14	1	6	3	5	2
Hungary	59	2			1	1	
Italy [1]	568						
Sicily	27						
Netherlands	[3] 1						

See footnotes at end of table.

TYPHUS FEVER

Place	January-November 1948	December 1948	January 1949—week ended—				
			1	8	15	22	29
EUROPE—continued							
Poland	360	14					
Portugal	4						
Azores: Ponta Delgada	[7] 1						
Madeira Islands: Funchal	1						
Rumania [1]	21,978	184	49	46	34		
Spain	21						
Turkey	362	29	4	5	11	10	
Yugoslavia	602	7					
NORTH AMERICA							
Costa Rica [2]	28						
Cuba [2]	24						
Guatemala	181						
Jamaica [2]	19	1	1				
Mexico [1]	1,124	4		2			
Panama Canal Zone [1]	8						
Panama Republic	6						
Puerto Rico [2]	38						
SOUTH AMERICA							
Argentina	20						
Bolivia	[8] 93						
Brazil	151	21					
Chile [1]	384	2		1			
Colombia [1]	3,017	217					
Curacao [2]	21	1					
Ecuador [1]	445	1					
Peru	834						
Venezuela [1]	164	[9] 1			[9] 1		
OCEANIA							
Australia [2]	160	8	2				
Hawaii Territory [2]	18	4					
Honolulu	3						
New Caledonia	1						

---

*Reports from some areas are probably murine type, while others include both murine and louse-born types.

[1] Includes murine type.

[2] Murine type.

[3] Corrected figure.

[4] Includes suspected cases.

[5] Includes nonresident and imported cases.

[6] Imported.

[7] Death.

[8] Includes 9 deaths reported as cases in Cochabamba Department in March 1948.

[9] In Maracaibo.

YELLOW FEVER

(C—cases; D—deaths)

AFRICA			
Belgian Congo:			
Stanleyville Province	D		
Gold Coast:			
Kumasi	D	1	
Accra	D	2	
Ivory Coast:			
Gagnao	D	1	
Sudan (French):			
Sebekoro	D	1	
NORTH AMERICA			
Panama:			
Pacora	C		

See footnotes at end of table.

YELLOW FEVER—Continued

Place		January-November 1948	December 1948	January 1949—week ended—				
				1	8	15	22	29
SOUTH AMERICA								
Argentina	D	1						
Cerro Azul, Misiones Territory	D	1						
Bolivia.[1]								
Brazil	D	3						
Bahia State								
Ilheus City, Itajuipe	D	1						
Ubaitaba County	D	1						
Rio Grande do Sul State								
Sao Luiz Gonzaga	D	[2] 1						
British Guiana	D	[3] 1						
Colombia	D	19						
Antioquia Department								
Maceo	D	4						
Yolomba	D	1						
Boyaca Department								
Campohermoso	D	1						
Caldas Department								
La Dorado	D	1						
Samana	D	1						
La Victoria	D	1						
Cundinamarca Department								
Medina	D	7						
Intendencia of Meta								
Cumaral	D	1						
Restrepo	D	1						
San Martin	D	1						
Peru [4]								
Loreto Department								
Nauta, Loreto Province	D	1						
Venezuela								
Bolivar State								
Boatanamo, Tumeremo County	D	1						

---

[1] Delayed report During the months of April and May 1947, 5 cases of yellow fever were reported in Bolivia distributed as follows Santa Cruz Department—Nuflo de Chavez 1, Concepcion 1, Cercado 1 La Paz Department—Province of Sud Yungas, Chulmani 1, Province of Nor Yungas, Coroico 1

[2] Suspected

[3] In forested area, 60 miles up Berbice River from Kwakwani

[4] Delayed report On July 23, 1948, 1 death from yellow fever was reported to have occurred in Tingo Maria, Huanoco Department, Peru, in the month of November 1947

DEATHS DURING WEEK ENDED JAN. 29, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Jan 29, 1949	Corresponding week, 1948
Data for 94 large cities of the United States		
Total deaths	9 518	10,478
Median for 3 prior years	10 156	
Total deaths, first 4 weeks of year	40 114	42 360
Deaths under 1 year of age	635	680
Median for 3 prior years	677	
Deaths under 1 year of age first 4 weeks of year	2,745	2,913
Data from industrial insurance companies		
Policies in force	70 653 568	66,912,156
Number of death claims	13 741	13,904
Death claims per 1,000 policies in force, annual rate	10 1	10 9
Death claims per 1,000 policies, first 4 weeks of year, annual rate	9 6	11 2

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TUBERCULOSIS CONTROL ISSUE NO. 37

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
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This is the thirty-seventh of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year, $1.25 foreign.

Public Health Reports

Vol. 64 • MARCH 4, 1949 • *No. 9*

Tuberculosis Studies in Muscogee County, Georgia [1]

I. Community-wide Tuberculosis Research

By George W. Comstock, *Surgeon* [2]

The Muscogee County Health Department, assisted by the Georgia Department of Public Health and the United States Public Health Service, in 1946, undertook to establish in a community of about 100,000 people a cooperative facility with the principal purpose of combining effective tuberculosis control and a broad basic epidemiological study of tuberculosis. The essential difference between this endeavor and the activities of the usual health department is that in the former a service program is integrated with research.

The behavior of a disease in an individual patient is usually described in terms of the abnormalities it causes; this presupposes a knowledge of what is normal for that patient. If the behavior of a disease in a community is to be described intelligently, a description of the total population is necessary with as much emphasis on the normal members of that community as upon those affected by the disease. For, if any illness is to be understood and finally prevented, enough must be known about the population from which the disease arises so that we may eventually learn the characteristics of those who succumb to it. Only when these characteristics are known can we hope to change them in such a way that the disease will no longer occur.

In tuberculosis, the average health department concentrates on the persons with abnormalities and gives them service. Those with the greatest abnormalities are given the most service. Epidemiological research, on the other hand, must consider not only those apparently in need of service but must give attention to all persons within the study area. It must take into account not only the people who have been examined, but those who have not been examined. It must concern itself with the normal as well as the abnormal, and—among the abnormal group—with slight as well as gross anomalies. Such a research program must pay attention to the entire community.

---

[1] From the Field Studies Branch, Division of Tuberculosis, Public Health Service.

[2] Medical Director, Muscogee County Tuberculosis Study; Tuberculosis Control Officer, Muscogee County Health Department.

Accordingly, extensive epidemiological investigations are not undertaken by the average health department which under ordinary circumstances can do only extremely limited research. However, with attention not only to the sick but to those persons without demonstrable pathology, many service programs could add to our knowledge about the development of disease. The experience of the Muscogee County tuberculosis study illustrates how an extensive research program can be closely woven into the usual health department services in tuberculosis control.

The purpose of the Muscogee Study was to gain as complete a knowledge as possible of the community so that all factors which influence the spread of tuberculosis could be evaluated. One requisite for a study of this kind is a census and a collection of other basic information concerning the total population. In Muscogee County a special census was made in 1946, and, in addition to the usual census data, several items of information on housing were gathered. These items were used as an index of socioeconomic forces. Additions and deletions of birth and death records help to keep the census up to date.

To obtain information about the tuberculosis experience of as many persons as possible, a community-wide chest X-ray survey was made and tuberculin tests were given to all school children. These projects yielded basic data about both the examined and unexamined groups, and, for the examined, information about both the normal and the abnormal.

X-ray examinations in the local health department clinic have been greatly expanded so that approximately one-sixth of the entire population is X-rayed each year. The follow-up program is intensive—persons with even slight abnormalities are followed as carefully as those with major pathology. Future community X-ray surveys and tuberculin surveys are planned to keep all the information current.

The problem of combining the mass of data into usable form was solved to a considerable degree by the use of a master index file. In this file each individual known to be in the community has a separate card, which reveals in both visible and punch-card form, his identification data, housing conditions, tuberculin sensitivity, contact history and the results of all chest X-ray examinations.

As soon as enough information has been accumulated many epidemiological problems can be attacked. The mass survey, continued case-finding procedures, and repetition of the mass survey at intervals will yield invaluable data about the large number of people who were considered normal in the first survey. The future histories of these people will reveal the incidence of tuberculosis in a sizable population, and it should be easy to discover the source of infection for newly developed cases among this group because of the limited time between examinations. These procedures should clarify to some extent the pattern of infection and should also help us to determine an optimum interval between mass surveys.

An evaluation of the mass X-ray survey as a method of case finding is needed. Few persons would now affirm that the method is without value, but we do not yet have a definite measure of its worth. In Muscogee County an effort has been made to evaluate the survey in terms of what percentage of the population it reached and which groups in the population responded best. This information has been correlated with social data—economic indices, age, sex, race—and the results of the correlation are presented in the second paper of this series which is included in this issue. An even more searching evaluation will be possible when enough time has elapsed to correlate the carefully collected data with the new cases which are discovered in both the previously examined and unexamined groups.

The case-finding survey should also be compared with other methods of discovering new cases if its effectiveness is to be known. In addition to mass X-rays, Muscogee County health administrators have continued to use the classical methods of control—contact investigations, tuberculin studies, examination of contacts of tuberculin-positive children, and clinic examinations. A comparison of methods, therefore, is possible. Little is to be gained from a comparison of the initial findings. Proof will lie in the subsequent history of people discovered by the different methods to have tuberculosis and, more importantly, in the subsequent history of their contacts. These data are being collected in the Muscogee County Study and will become available for analysis as soon as enough time has passed to make them significant. Coincidentally, similar studies can be made of the history of persons found by mass X-ray programs to have nontuberculous chest diseases.

Certain refinements in mass survey techniques may also be evaluated. One of these is the practice of having survey films read independently by two different readers. The initial benefits of this technique have already been described,[3] and the value of the procedure in terms of subsequent morbidity and mortality rates can be determined within the framework of the Muscogee Study. Methods of obtaining follow-up from the mass surveys are also being studied. It is expected that the systematic collection of data, with methods suitably controlled, will help answer the problems about survey follow-up that are constantly arising.

Information from the mass survey need not be restricted to use in the field of tuberculosis control. A large survey in many respects is a partial enumeration of the population, and comparison between the persons listed in the Muscogee County survey and in the census provide a check on the accuracy of the census, as well as on the coverage of the survey. A future survey, if largely successful and properly analyzed, will reveal the movements of population groups in this community.

---

[3] Birkelo et al· Tuberculosis Case Finding: A comparison of the effectiveness of various roentgenographic and photofluorographic methods. J. A. M. A. 133: 359–366 (1947).

Tuberculin studies in the schools and a projected tuberculin survey of the entire community should strengthen and clarify much of our investigational work. The value of tuberculin testing as a case-finding technique and the patterns of tuberculin sensitivity in the county may be discovered. Closely related is BCG vaccination, which has been offered to Muscogee County school children under controlled circumstances. Although the number vaccinated was small, results should yield significant conclusions because of the detailed knowledge available about both the vaccinated and the control groups.

For a long time it has been felt that socioeconomic factors have great influence on the development of tuberculosis, the fate of infected persons, and the readiness with which patients accept treatment. Lack of knowledge about the normal group, as well as the restriction of many socioeconomic studies to selected population groups, has prevented an adequate determination of the role of these factors both in the development of the disease and in the behavior of tuberculous patients. The information obtainable through a broad research facility which is almost indistinguishable in many respects from a service program can readily be used to answer basic sociological questions in tuberculosis.

Other fundamental problems to which such data can be applied include the familial aspects of tuberculosis, and the effect of the disease on the fertility of families.

Without comprehensive planning and close attention to epidemiological principles the research value of the Muscogee Study would have been limited. That it promises to shed some light on the behavior of tuberculosis in addition to rendering service to the community is, perhaps, also related to the composition of its staff. There are more workers than is usual in a chest clinic. A full-time statistician is assigned to the study, and the over-all planning and execution has been under the direction of an epidemiologist who has given the necessary research outlook to what might otherwise have been only an intensive service program.

Anyone who has had personal experience with large-scale epidemiology will quickly realize that the problems presented in this paper are so great that no one group, even supported and assisted by several large agencies, can hope to attack and solve all of them. This study is the work of many cooperative agencies, and could hardly have achieved its solid foundation in the community without their active assistance. It is likely that more cooperation will lead to progressively greater realization of the potentialities of this work.

* * *

The Muscogee County Tuberculosis Study was due almost entirely in its conception and early execution to the broad vision and vigorous stimulation of Dr. J. Yerushalmy, formerly Principal Statistician, Field Studies Branch, Division of Tuberculosis, Public Health Service, and presently Professor of Biostatistics, School of Public Health, University of California.

It is impossible to assign exact degrees of participation in this research facility to all the cooperating organizations. We are deeply grateful, however, for the assistance given by the following groups:

Alabama Department of Public Health; Bureau of the Census, Department of Commerce; Columbus Board of Education, Columbus City Commission; Columbus Housing Authority; Division of Tuberculosis, Public Health Service; Division of Venereal Disease, Public Health Service.

Family Service Bureau, Columbus, Ga.; Georgia Department of Education, Division of Vocational Rehabilitation; Georgia Department of Public Health; Georgia Tuberculosis Association; Industrial Nurses' Association, Columbus, Ga.; Junior Chamber of Commerce, Columbus, Ga.; Junior League, Columbus, Ga.

The Muscogee County Board of Education, Commissioners of Roads and Revenue, Department of Public Welfare, Health Department, Medical Society, and Tuberculosis Association; Parent-Teacher Association, Columbus, Ga.; Russell County Health Department, Phenix City, Ala.

Tuberculosis Studies in Muscogee County. Georgia

II. X-Ray Findings in a Community-wide Survey and Its Coverage as Determined by a Population Census [1]

By M. H. Burke,[2] H. C. Schenck,[3] and J. A. Thrash [4]

For many years mass radiography of apparently healthy persons was limited to special groups. Because chest X-rays were expensive and more tuberculosis could be expected in some groups than in others, X-rays were made primarily of contacts of known cases of tuberculosis, positive tuberculin reactors, and sometimes the contacts of positive tuberculin reactors.

With the introduction of photofluorography, however, it became economically possible to examine groups of people among whom there was no reason to suspect an unusual prevalence of tuberculosis. Industrial employees were easy to reach, and they were one of the first apparently healthy groups surveyed. People in mental hospitals, a few general hospitals, prisons and schools were included in the earlier surveys. During World War II, routine chest X-rays were included in both the induction and discharge examinations of members of the armed forces.

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In the present community-wide surveys some units go to industries, others to schools, and still others to those heterogenous parts of the population which are not accessible as groups. The units are placed in convenient neighborhood locations or in business sections to reach all the people in the community.

The community-wide chest X-ray survey has been widely accepted as a practical and effective method of tuberculosis control. But the effectiveness of such a survey depends upon its completeness, on the isolation and care of infectious cases, and on the provision for adequate follow-up of the noninfectious cases.

Little information has been available about the exact coverage of community-wide surveys or about the population groups reached. A few surveys have been preceded or accompanied by a house-to-house canvass or census which served two purposes—to tell the people about the opportunities of the survey and to provide such a knowledge of the community that during or after the survey, it would be possible to know who had and who had not been examined. This procedure in this country has apparently been limited to small communities and the coverage has been excellent (*1*).

The community-wide survey in Muscogee County, Ga., was followed closely by a population census and a housing survey. Thus it has become possible, by combining the data collected in both the survey and census, to measure the completeness of an X-ray survey in various population groups in a county of approximately 100,000 population. Both the radiological and demographic characteristics of the examined population can be described. The census data also give us knowledge of certain characteristics of the unexamined population, which as far as we know has not been obtained previously in a group of this size.

The first large community-wide survey, carried on in Savannah, Ga., in October 1945, was a joint venereal disease-tuberculosis program in which each person was offered a blood test and a chest X-ray. It was estimated that approximately 65 percent of the population over 15 years of age was reached in this undertaking. Muscogee County, Ga., was the location of a second similar program in May and June of 1946. Cooperating on the project were the City-County Health Department, the Georgia State Health Department, the Public Health Service and the State and local Tuberculosis Associations.

Description of Survey

The Muscogee County survey was conducted for 6 weeks during May and June 1946. Every person in Columbus, Ga., and the surrounding county who was over 12 years of age was offered a blood test and a chest X-ray. Continuous publicity throughout the period of the survey included newspaper stories, radio announcements, 6-foot posters on downtown lamp-posts, club announcements, leaflets enclosed in mailing lists, and sound-truck publicity on the streets. There was no house-to-house educational and publicity program.

Six units were used to take 70 millimeter photofluorograms. Three remained in the same locations throughout the survey. The unit at the City-County Health Center was used as a station for both white and Negro persons. Another unit in a downtown shopping location was open to the white population only, and a third in a Negro shopping center was for Negroes only. One unit, used almost exclusively in factories, was moved every few days to a new location. Another unit open to the general public moved to various neighborhoods in the course of the survey. A sixth unit covered the junior and senior high schools and some neighborhood areas.

Chest X-rays were made of 51,940 persons, of whom 46,743 gave Muscogee County addresses. An additional 3,278 persons, mostly Negro school children, received blood tests but no X-rays. Most of the remainder X-rayed came from Phenix City, Ala., a part of metropolitan Columbus, just across the State border. Since many residents of Phenix City and Russell County, Alabama, are employed in the mills and factories of Columbus, and since the existence of the State line does not separate the activities of these two adjacent counties, it seemed advisable to survey Russell County as well. Therefore, at the end of the Muscogee County survey, three of the X-ray units moved to Russell County and in 2 weeks X-rayed 9,500 people there. These additional examinations, while useful in the tuberculosis control program, are not included in this report.

All the 70 mm. films in the Muscogee County survey were read independently by two chest physicians (*2*). Any person whose film was read as "tuberculosis" or "suspected tuberculosis" by one or both readers was recalled for a 14" x 17" film at the City-County Health Center. Most of these follow-up films were taken between May and September 1946.[5] Seventy millimeter "recalls" who did not respond to the recall letters were later visited in their homes and the initial large films were taken after September. By July 1, 1948, 86 percent of the 70 mm. suspects had had 14" x 17" films. These were also interpreted by two readers. If the 14" x 17" film was read as "tuberculosis" or "suspected tuberculosis" by either reader, the patient was placed in the "to be followed" group, to be X-rayed at least once every 3 months.

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[5] The response to the various follow-up techniques will be reported in a later paper.

Later in this paper, in the determination and discussion of prevalence rates, "tuberculosis" will include all cases of reinfection tuberculosis, active or questionably active primary tuberculosis, pleurisy with effusion, and all persons whose initial 14" x 17" chest films were thought to be suspicious of tuberculosis.

Description of Census

A necessary technique in the establishment of a research facility for the study of the community-wide epidemiology of tuberculosis is an enumeration of the population. The census becomes the base line data, the denominator, for the study program. Accordingly, a census was conducted in Muscogee County in September 1946.

To determine what groups of the population the survey reached and to discover the prevalence of tuberculosis in these groups this special census of the population was invaluable. Also, since in practice the goal of a 100 percent coverage of a county of 100,000 people was not attained, the census identified the individuals who lived in the county but were not X-rayed. The census and survey together described the population; the groups X-rayed and those not X-rayed.

In most of the larger community-wide surveys, estimates have been made of the coverage of the population by age, race and sex. However, estimates of population are unreliable because of the long interval since the 1940 census and the great movement of the population during and since the war.

The September 1946 enumeration was not an official census according to the U. S. Census Bureau. If a census is conducted by this agency, the record of each individual is considered to be confidential and is not available for use by other agencies. Since it was necessary for the research program to identify the individual, the census was carried on by personnel of the Muscogee County Tuberculosis Study with consultative service from the Bureau of the Census. A household schedule was used to obtain the name, address, race, sex, marital status and relationship to the head of the household of each person. It also included a few simple questions on housing. Addresses were checked with all available directories to make sure the census taker had located each known address. In each enumeration district, a spot check was made in which 5 percent of the households were reenumerated. These checks indicated very little under-enumeration. (See figure 5, page 276.)

The enumerated population of the county was 95,638, of which 28,706 or 30 percent were Negro. Muscogee County has only one city, Columbus. Within the 1946 city limits—an area of 6¾ square miles—there were 57,000 persons. If the urban area which was then outside the city limits but was annexed in January 1949, is included, the population of the city becomes close to 75,000. There are a few densely populated subsections in the rest of the county but most of the areas are rural. The entire county, exclusive of a military reservation, covers an area of approximately 130 square miles. It is bounded on the west by the Chattahoochee River, which forms a State boundary. Directly across the river is Russell County, Ala., with Phenix City as its county seat. In 1948, Phenix City had a population of 22,187. It is included in metropolitan Columbus. On the south and east is the Fort Benning reservation, a large army post. The counties on the north and northeast are rural and there is no large city nearby.

At the end of the census period, the survey and census records were arranged by address and matched. The records were more easily matched by address than by name because there were frequent discrepancies in the spelling of names. Those unmatched were then rearranged alphabetically and a second attempt was made to match them. The records for households or individuals who had moved during the 3-month interval between the survey and the census could be matched only in this way. Because of the appreciable interval between the survey and the census many problems arose. Columbus is an industrial city and is adjacent to an Army post. There are many changes in population from moves within the county, and in and out of the county. After every effort had been made, 19 percent of the survey records still could not be matched with a census record. The person with only an unmatched survey record may have moved from the county in the intervening 3 months, he may have been missed in the census, or he may still have been in the county and have been enumerated in the census but because of differences in addresses or in the spelling of names his two records could not be brought together. However, a field investigation of a sample of the unmatched survey records revealed that probably there was but little underenumeration and that many people had actually moved from the county.

Survey Coverage by Age, Race and Sex

The percent of the population covered by the survey is shown by age, race, and sex in table 1 and figure 1, which are based on an assumption that the census population in September was representative of the population at the time of the survey in May and June and that all those surveyed who used Muscogee County addresses came from this population. The assumption implies that the number of persons who moved out of the county in the interval between the survey and census equalled the number who moved into the county in the same interval. Generally, X-rays were offered only to those over 12

Table 1. *Number and percent of census population examined in community-wide survey by age, race and sex; Muscogee County, Ga., 1946*

Age	Total			White male			White female		
	Population	Number surveyed	Percent surveyed	Population	Number surveyed	Percent surveyed	Population	Number surveyed	Percent surveyed
Under 5 yrs	10,470	61	0.6	3,989	17	0.4	3,791	15	0.4
5-9	8,070	1,639	20	2,822	80	3	2,661	95	4
10-14	7,447	4,863	65	2,345	1,040	44	2,440	1,148	47
15-19	7,480	6,202	83	2,094	1,433	68	2,886	2,117	73
20-24	10,118	6,135	61	2,884	1,094	38	4,232	2,162	51
25-34	19,412	12,054	62	6,761	2,936	43	7,085	3,962	56
35-44	14,376	9,654	67	4,930	2,546	52	4,966	3,023	61
45-54	9,025	5,637	62	3,044	1,634	54	3,238	1,659	51
55-64	5,124	2,568	50	1,752	847	48	2,056	797	39
65-74	2,937	1,003	34	900	326	36	1,191	257	22
75 and over	1,037	180	17	276	63	23	460	28	6
Not stated	142	25	--------	51	4	--------	64	6	--------
Total	95,638	50,021	52	31,848	12,020	38	35,070	15,269	44
Total over 15 years	69,651	43,458	62	22,692	10,883	48	26,178	14,011	54

Age	Negro male			Negro female			Sex or color not stated	
	Population	Number surveyed	Percent surveyed	Population	Number surveyed	Percent surveyed	Population	Number surveyed
Under 5 yrs	1,335	13	1	1,352	16	1	3	--------
5-9	1,256	706	56	1,331	756	57	--------	2
10-14	1,332	1,328	100	1,330	1,343	101	--------	4
15-19	1,047	1,139	109	1,453	1,510	104	--------	3
20-24	1,175	1,100	94	1,826	1,779	97	1	--------
25-34	2,398	2,173	91	3,162	2,983	94	6	--------
35-44	2,002	1,897	95	2,478	2,188	88	--------	--------
45-54	1,249	1,125	90	1,493	1,219	82	1	--------
55-64	565	447	79	751	477	64	--------	--------
65-74	367	211	57	477	209	44	2	--------
75 and over	109	48	44	191	40	21	1	1
Not stated	11	5	--------	16	10	--------	--------	--------
Total	12,846	10,192	79	15,860	12,530	79	14	10
Total over 15 years	8,923	8,145	91	11,847	10,415	88	11	4

years of age. Negro children in elementary schools were given blood tests but were not X-rayed. They are included as "surveyed," and therefore the number of "surveyed" exceeds the number X-rayed. Any person whose 70 mm. film was unsatisfactory and who did not return for a retake has been considered "surveyed" but not X-rayed. Of the total population over 15 years of age, 62 percent was reached by the survey. The coverage was very different in the white and Negro populations. Only 51 percent of the white population over 15 years of age was surveyed, but 89 percent of the Negro population over 15 years was reached.

In the white population, the age restriction accounts for the relatively low proportion of children surveyed in the 10–14-year age group and for the increase, in the 15–19-year age group, to 68 percent for males and 73 percent for females. In the 20–24-year age group there is a drop in the percent of white males and females surveyed to 38 and

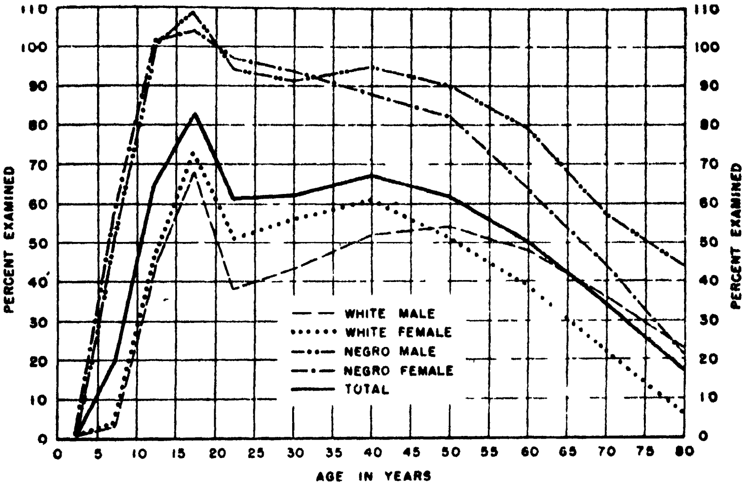

Figure 1. Percent of population examined in community-wide survey by age, race, and sex; Muscogee County, Ga., 1946.

51, respectively. It is in the 35–44-year age group that a second peak is reached for white females with 61 percent X-rayed; and it is in the 45–54-year age group that the second peak of 54 percent for white males is reached. After these peaks, as might be expected, the percentage X-rayed falls off steadily with increasing age. Relatively more white men over 45 were X-rayed than white women. The oldest groups were less likely to be reached by industrial survey units and the oldest white females were even less likely to be reached by such units. The poor response among white males aged 20 through 34 may be due to the fact that many had been recently discharged from the armed forces with a discharge X-ray and did not feel the need for another examination. On the other hand, there is a depression in the curve for white females in the same age group, which cannot be explained by the same reason.

The percent of the Negro race surveyed was higher in each age group than in the corresponding age group among white persons. The curve of percentages starts to rise earlier because of the blood testing program in Negro elementary schools. In the 10–14-year age group the percentages surveyed reached 100 and 101 in the males and females respectively; in the 15–19-year-age group the percentages were as high as 109 in the males and 104 in the females.

These percentages may indicate an under-enumeration of the population in the census or an over-enumeration in the survey. Both factors actually existed. Phenix City residents may have given a Muscogee County address, believing it necessary in order to have an

X-ray. It has been observed that Negroes are likely to move about frequently, both in and out of the county and within the county. Some may have had two survey records with different addresses or different names, and only one could be matched with a census record. The number missed in the census was probably greater in Negro households, since families are larger in size and the children frequently live with different relatives at different times. These reasons may account for the unduly high percentages.

For Negro women over 20, the percent surveyed falls off slowly to 82 among those 45–54 years, and more rapidly after that. In the group over 75 years of age only 21 percent were X-rayed. Among the Negro males, a slight drop, not nearly as marked as that observed among white males and females, appears from 20 through 34 years of age. Ninety-five percent were X-rayed in the age group 35 to 44, and following that the percentages decreased with increasing age. But even so, 44 percent of the Negro males over 75 years of age were X-rayed.

Table 2. *Number and percent of census records matched with survey records by age, race, and sex; Muscogee County, Ga., 1946*

Age	Total			White male			White female		
	Population	Number matched	Percent matched	Population	Number matched	Percent matched	Population	Number matched	Percent matched
Under 5 years	10,470	47	0.4	3,989	14	0.4	3,791	13	0.3
5–9	8,070	1,264	16	2,822	67	2	2,661	82	3
10–14	7,447	4,077	55	2,345	902	38	2,440	1,014	42
15–19	7,480	4,602	62	2,094	1,167	56	2,886	1,547	54
20–24	10,118	4,345	43	2,884	785	27	4,232	1,573	37
25–34	19,412	9,563	49	6,761	2,316	34	7,065	3,259	46
35–44	14,376	8,394	58	4,930	2,233	45	4,966	2,664	54
45–54	9,025	4,925	55	3,044	1,432	47	3,238	1,494	46
55–64	5,124	2,229	44	1,752	718	41	2,056	710	35
65–74	2,937	869	30	900	278	31	1,191	226	19
75 and over	1,037	151	15	276	54	20	460	23	5
Not stated	142	19	------	51	4	------	64	6	------
Total	95,638	40,435	42	31,848	9,970	31	35,070	12,611	36
Total over 15 years	69,651	35,047	50	22,692	8,987	40	26,178	11,502	44

Age	Negro male			Negro female			Sex or color not stated	
	Population	Number matched	Percent matched	Population	Number matched	Percent matched	Population	Number matched
Under 5 years	1,335	10	0.7	1,352	10	0.7	3	------
5–9	1,256	540	43	1,331	575	43	------	------
10–14	1,322	1,058	80	1,330	1,098	82	------	------
15–19	1,047	815	78	1,438	1,073	74	------	------
20–24	1,175	780	64	1,836	1,227	66	1	------
25–34	2,398	1,649	69	3,162	2,380	75	6	------
35–44	2,003	1,553	77	2,473	1,885	76	------	------
45–54	1,249	928	74	1,498	1,076	72	1	------
55–64	565	371	66	751	430	57	------	------
65–74	367	183	50	477	183	38	2	------
75 and over	160	39	36	191	24	13	1	1
Not stated	11	2	------	16	7	------	------	------
Total	12,846	7,881	61	15,860	9,972	63	14	1
Total over 15 years	8,966	6,283	70	11,847	8,304	70	11	1

The preceding figures are based on the assumption that a census population was the base population for the survey and that all those whose survey records had Muscogee County addresses actually represented persons examined. However, as a starting point for the longer epidemiological study in Muscogee County, it may be worth while to consider only survey records matched with census records in order to determine the portion of the September census population already examined. This will identify more precisely the X-rayed and the non-X-rayed. It is realized that newcomers to the county in the interval between survey and census did not have an opportunity to accept survey examinations. But nevertheless, they must still be included in the unexamined group as far as our knowledge of the county is concerned. The known coverage of this census population over 15 years of age then becomes 50 percent.

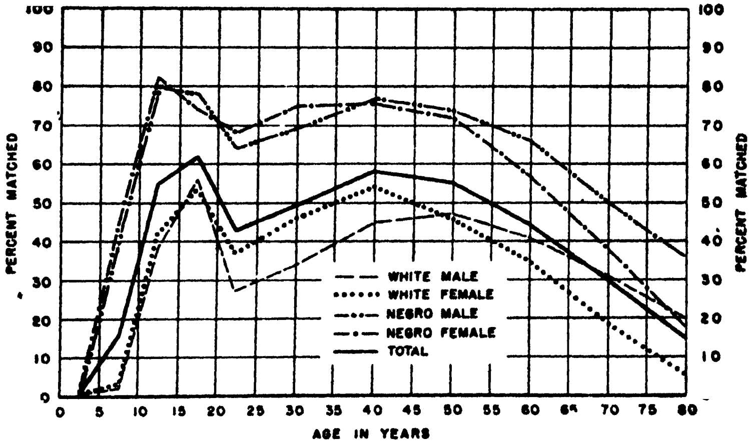

Figure 2. Percent of census records matched with survey records by age, race, and sex; Muscogee County, Ga., 1946.

This figure is 42 percent for whites and 70 percent for Negroes, and represents a decrease from table 1 of 9 percent in the white coverage and 19 percent in the Negro. The difference represents those who have moved, those whose records could not be matched because of differences in name and address, and those who were not enumerated in the census. Table 2 gives the census population, the census population known to be surveyed and the percent known to be surveyed by age, race, and sex. In all four race and sex groups the 20–34 age groups show a smaller percent surveyed than in the immediately preceding or following groups. This depression is more pronounced than that in figure 1 and indicates that the young adult population is less stationary. A low point of 27 percent X-rayed was reached in the 20–24 age group in white males. The percentage curves for Negro and white groups follow each other more closely in age trends when only matched records are used (fig. 2).

Survey Response by District

It is possible that the response to a mass survey program may be different in various socioeconomic groups. To test this possibility, Muscogee County has been divided into 12 large districts by combining adjoining small enumeration districts which are as comparable as possible in percentages of white and Negro population, rents, and the general condition of the housing units. It is impossible to obtain strictly homogeneous districts, since the lack of zoning ordinances has allowed many of the enumeration districts to become quite variegated in their characteristics, often with opposite extremes in the same enumeration area. However, these 12 districts are, within their individual boundaries, as intrinsically uniform as possible, and conform closely to the popular, if unofficial, subdivisions of the county.

White Population

Table 3 shows the white population over 15 years of age in each district and the number and percent known to have been surveyed by sex.

Table 3. *Number and percent of white census population over 15 years of age, matched with survey records by district and by sex; Muscogee County, Ga., 1946*

District	Total			Male			Female		
	Population	Number matched	Percent matched	Population	Number matched with survey	Percent matched	Population	Number matched with survey	Percent matched
I	2,568	1,602	62	1,193	758	64	1,375	844	61
II	5,810	3,340	57	2,746	1,513	55	3,064	1,827	60
III	4,935	2,737	55	2,271	1,214	53	2,664	1,523	57
IV	5,371	2,261	42	2,452	1,033	42	2,919	1,228	42
V	4,621	2,198	48	2,043	903	44	2,578	1,295	50
VI	4,482	1,404	31	2,027	542	27	2,455	862	35
VII									
VIII	2,033	682	34	937	269	29	1,096	413	38
IX	3,248	1,013	31	1,559	430	28	1,689	583	35
X	6,467	2,269	35	2,955	1,029	35	3,512	1,240	35
XI	2,273	485	21	1,093	140	13	1,180	345	29
XII	7,041	2,485	35	3,409	1,151	34	3,632	1,334	37
Not stated	21	13		7	5		14	8	
Total	48,870	20,490	42	22,692	8,987	40	26,178	11,503	44

Only matched survey records were used. Figure 3, a map of Columbus and its immediate environs, shows by district the percent of the population matched with a survey record. District I, which is almost exclusively a white housing project owned and maintained by one of the local industries, has good housing and the lowest rents in the county. A higher percent of people were surveyed in this district than in any other; 62 percent were known to have responded. Neighboring districts II and III were next in order with a known coverage of 57 and 55 percent. Eighty-six percent of the population of these two districts was white. District V is composed partly of good housing sections and partly of very poor ones, partly of white and partly of Negroes. Of the white population, which was 56 percent of the total, 48 percent were X-rayed. The response was best in the poorest sections in this district. In district IV, a slightly better white residential section, 42 percent were X-rayed. Together, these five districts, which rank as the first five in response to the survey, form the northern half of the city and include the densely populated areas directly north of the city. Many industries are located in this larger area.

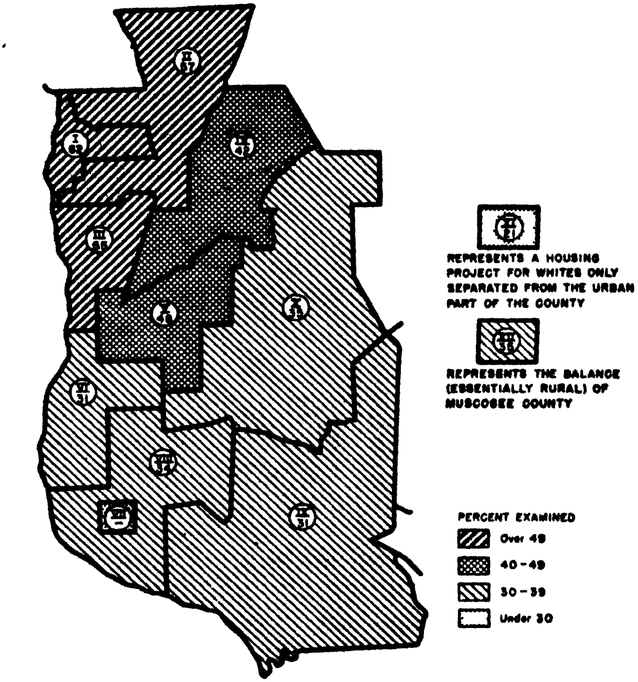
II 57
I 62
IV 42
III 55
VI 31
VIII 34
VII —
IX 31
XI 21
REPRESENTS A HOUSING PROJECT FOR WHITES ONLY SEPARATED FROM THE URBAN PART OF THE COUNTY
REPRESENTS THE BALANCE (ESSENTIALLY RURAL) OF MUSCOGEE COUNTY
PERCENT EXAMINED
Over 49
40 - 49
30 - 39
Under 30

Figure 3. Percent of white population over 15 years of age examined in the survey shown by 12 districts; Muscogee County, Ga., 1946.

About 4 miles southeast of the city, near Fort Benning, is a white housing project, district XI, occupied almost exclusively by army families. Thirteen percent of the white males were X-rayed and 29 percent of the white females. The poor response here may be because these families rely largely on army medical services. Districts VI and VIII, in the southern half of the city, near the main business center are the oldest sections in Columbus, in which there are now many rooming houses with many temporary residents. The response in these two downtown districts was also poor—32 percent. Moreover, in the best residential areas, districts IX and X, only 34 percent were X-rayed. The remainder of the county which lies north, east and south of the city has been combined into district XII. In these more rural areas, 35 percent of the population was X-rayed. In every district except I and IV, a larger percent of the females were X-rayed than the males.

Negro Population

Table 4 and figure 4 are similar to the preceding ones in that they show the percent of the Negro population surveyed in the same 12 districts. The industrial X-rays do not play a significant part in the coverage of the Negro group—only 10 percent of the X-rays taken were obtained in the industrial stations, since few Negroes are employed in industry. The majority responded individually at public X-ray stations. There is less variation in the percent X-rayed by districts. Housing district VII ranks first with 80 percent known to have responded. Apart from this, districts with a high percent of whites X-rayed are usually districts in which a high percent of Negroes were X-rayed. The lowest coverage, 64 percent, was reached in district X, the best white residential area, where only 3 percent of the population was Negro. District IX, which contains a good white residential area, but which is 56 percent Negro, was the next lowest with 67 percent surveyed.

Table 4. *Number and percent of Negro population over 15 years of age matched with survey records by district and by sex; Muscogee County, Ga., 1946*

District	Total			Male			Female		
	Population	Number matched	Percent matched	Population	Number matched with survey	Percent matched	Population	Number matched with survey	Percent matched
I	5	3	60	------	------	------	5	3	60
II	850	646	76	368	282	77	482	364	76
III	899	681	76	375	272	73	524	409	78
IV	488	339	69	215	153	71	273	186	68
V	3,575	2,491	70	1,485	1,061	71	2,090	1,430	68
VI	373	250	67	147	96	65	226	154	68
VII	1,332	1,069	80	535	434	81	797	635	80
VIII	6,121	4,260	70	2,536	1,755	69	3,585	2,505	70
IX	4,156	2,770	67	1,837	1,207	66	2,319	1,563	67
X	239	154	64	94	62	66	145	92	63
XI	------	------	------	------	------	------	------	------	------
XII	2,717	1,884	69	1,324	937	71	1,393	947	68
Not stated	------	------	------	7	4	------	8	6	------
Total	20,770	14,557	70	8,923	6,263	70	11,847	8,294	70

If all records, matched and unmatched, are used to determine the survey coverage in these 12 districts, the percent surveyed will be higher in every one. Moreover, the increase will be greater in those districts in which the population has been described as less stationary because such areas produced relatively more unmatched records. District VI, with many homes converted into rooming houses and apartments, has the lowest percent, 61, of survey records matched for the white group. The highest percent matched, 92, is found in the best residential area, district X. The total number X-rayed in this district was increased but little by the addition of possible respondents for whom there was no census record. Therefore, if the Army housing area is excluded, district X becomes the poorest in response when coverage is based on all survey records. District XII, the rural sections of the county, has a third of the survey records unmatched, probably because the use of the rural mail route as the only address on the X-ray record made the matching difficult and unsatisfactory.

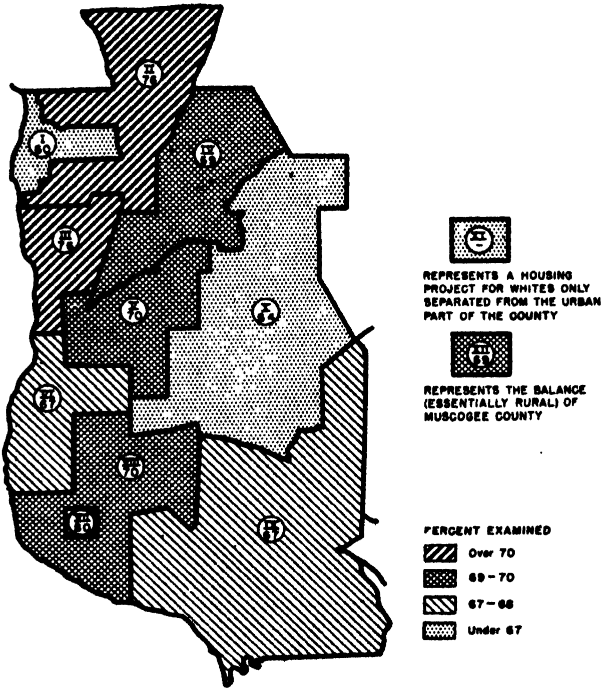
REPRESENTS A HOUSING PROJECT FOR WHITES ONLY SEPARATED FROM THE URBAN PART OF THE COUNTY
REPRESENTS THE BALANCE (ESSENTIALLY RURAL) OF MUSCOGEE COUNTY
PERCENT EXAMINED
Over 70
69 – 70
67 – 68
Under 67

Figure 4. Percent of Negro population over 15 years of age examined in the survey shown by 12 districts; Muscogee County, Ga., 1946.

Among the Negroes, the best matching was accomplished in the district made up of two housing projects where 88 percent were matched. In districts IV and X, both predominantly white, only 69 and 60 percent of the records for Negroes were matched. It may have been that domestic servants used their employers' addresses on the survey record, but were enumerated at their own addresses, or employers may not have included in the household roster servants who have living quarters in the employer's home. The other nine districts showed little variation in the percentages of unmatched records.

Census of Population

Muscogee County, Georgia, September 1946

A—E. D. No.	B—Block No.	C—Schedule No.	D—Street and House No.
E—Enumerated by		F—Date completed ...., 1946.	G—Number of calls 1 2 3 4 5

Line No. (1)	NAME (last name first) (2)	Relationship to head of household (3)	Sex (M or F) (4)	Color or Race (W, Neg. or Oth) (5)	Age at last birthday (6)	Marital status (S, M, Wid, Div, Sep) (7)
1						
2						
3						
4						
5						
6						
7						
8						
9						

(8) FACILITIES OF PRESENT DWELLING UNIT

a. Flush toilet in the structure for exclusive use: Yes .... No ....

b. Installed bathtub or shower in the structure for exclusive use: Yes .... No ....

c. Running water in the unit: Yes .... No ....

d. Source of water supply: City .... Other ....

(9) TYPE OF UTILITIES:

a. Electric lighting: Yes .... No ....

b. Heating ....

c. Cooking ....

(10) NUMBER OF ROOMS........................

(11) CONDITION OF PRESENT DWELLING UNIT.

Good condition or needs minor repairs..........

Needs major repairs..............................

Unfit for use ....

(12) TENURE OF PRESENT DWELLING UNIT.

Owned..

Rented...

(13) IF RENTED:

What is the monthly contract rent? $..........

Figure 5.

Survey Response by Households

The survey reached 89 percent of the Negro households and 63 percent of the white households enumerated in the 1946 census. If one person in a household is X-rayed, it seems reasonable to expect that other members of the family will be X-rayed since the importance of the survey will have been emphasized to someone in that family. In other words, more families with no member X-rayed should be observed than would be expected on the basis of chance only. To test this assumption, the households enumerated in the census were tabulated by race, by the number of persons over 12 years of age in the household and by the number of these X-rayed.

The probability that a person would be X-rayed was determined by race for each size of household by dividing the number of persons X-rayed by the total number of persons in such households. The probability of a white person's being X-rayed was lower in a two-person household than in a one or three-person household. After this, the probability increased with size of household to a peak in the five-person household. In households with more than six members the probabilities fall off, probably because roomers are often included in these larger units. In Negro households the probability of being X-rayed is lowest in the one-person household and highest in the seven-person. After the seven-person household the probabilities decrease.

Table 5. *Observed and expected number of households with all members examined or all members unexamined by size of household*

WHITE HOUSEHOLDS

Size of household	Number of households	Probability of individual being X-rayed	Number of households with all members X-rayed		Number of households with no member X-rayed	
			Observed	Expected	Observed	Expected
1	914	0.426	389	389	526	526
2	9,104	.378	2,164	1,300	4,390	3,526
3	3,725	.463	707	370	980	577
4	2,377	.472	329	118	451	186
5	1,059	.482	107	28	146	40
6	444	.474	30	5	45	9
7	131	.433	4	0	9	2
8	74	.412	2	0	7	1
9 and over	124	.314	2	0	9	3
Total	17,952	------	3,734	2,210	6,562	4,867

NEGRO HOUSEHOLDS

Size of household	Number of households	Probability of individual being X-rayed	Number of households with all members X-rayed		Number of households with no member X-rayed	
			Observed	Expected	Observed	Expected
1	514	0.658	338	338	176	176
2	2,525	.710	1,446	1,275	383	212
3	1,684	.712	758	607	139	40
4	1,196	.708	436	300	53	9
5	602	.728	204	123	20	1
6	248	.704	63	30	9	0
7	115	.732	36	13	2	0
8	60	.669	9	2	0	0
9 and over	41	.650	5	1	0	0
Total	6,985	--------	3,295	2,689	782	438

Using these probabilities in the binomial expansion, the number of families in which no one would be expected to be X-rayed was computed for each size of family. On the basis of chance then, it was expected that there would be altogether 4,867 white families in which no one would be expected to be X-rayed. Actually, 6,562 families failed to have even one member X-rayed. Likewise 438 Negro families would have no member X-rayed, but, in fact, there were 782 such families. It was also found that the proportion of families in which all of the adult members were examined was considerably higher than would be expected from a purely chance distribution of the X-rayed population. This suggests that if one person in a household accepts an X-ray examination, the liklihood of examining other members of that household is considerably increased.

Radiographic Findings by Age, Race and Sex

70 mm. Findings

Each person whose 70 mm. film was read as "tuberculosis (T)" or "suspected tuberculosis (S)" by either one of the two film readers, was recalled for a 14″ x 17″ film. In table 6 the X-rayed population, the number "recalled" as T or S, and the percent "recalled" are given by age, race and sex. Figure 6 shows these percentages in each age group by race and sex. The usually observed higher tuberculosis mortality in the Negro race is not reflected in the higher prevalence of

Table 6. *Number and percent of X-rayed population recalled as "tuberculosis" or "suspected tuberculosis" on the 70-mm. film, by age, race, and sex; Muscogee County survey, 1946*

Age	Total			White male		
	Number X-rayed	Number recalled	Percent recalled	Number X-rayed	Number recalled	Percent recalled
Total	51, 940	1, 871	3. 6	13, 601	612	4. 5
Under 15 years	3, 926	52	1. 3	1, 147	12	1. 0
15–24	13, 482	237	1. 8	2, 813	46	1. 6
25–34	13, 496	335	2. 5	3, 342	93	2. 8
35–44	10, 699	403	3. 8	2, 933	120	4. 1
45–54	6, 238	398	6. 4	1, 921	150	7. 8
55–64	2, 822	287	10. 2	1, 000	113	11. 3
65–74	1, 066	137	12. 9	374	65	17. 4
75 and over	181	22	12. 2	65	13	20. 0
Not stated	30	--------	--------	6	--------	--------

Age	White female			Negro male			Negro female		
	Number X-rayed	Number recalled	Percent recalled	Number X-rayed	Number recalled	Percent recalled	Number X-rayed	Number recalled	Percent recalled
Total	16, 711	611	3. 7	10, 062	314	3. 1	11, 566	334	2. 9
Under 15 years	1, 256	17	1. 4	761	11	1. 4	762	12	1. 6
15–24	4, 719	79	1. 7	2, 558	44	1. 7	3, 392	68	2. 0
25–34	4, 380	99	2. 3	2, 593	62	2. 4	3, 181	81	2. 5
35–44	3, 373	128	3. 8	2, 144	80	3. 7	2, 249	75	3. 3
45–54	1, 837	137	7. 5	1, 241	63	5. 1	1, 249	48	3. 8
55–64	855	108	12. 6	493	33	6. 7	474	33	7. 0
65–74	266	40	15. 0	217	17	7. 8	209	15	7. 2
75 and over	28	3	10. 7	49	4	8. 2	39	2	5. 1
Not stated	7	--------	--------	6	--------	--------	11	--------	--------

suspicious 70 mm. films. Of the white persons X-rayed, 4 percent were recalled. Only 3 percent of the Negroes were recalled, however. Below the age of 25 the Negro recall rates are higher than the whites, though not significantly so, but above the age of 25 for males and 35 for females, the white rates are higher. In the older age groups there is a wide difference between the two races. Sixteen percent of the whites between 65 and 75 who were X-rayed were recalled; only 8 percent of the Negroes in the same age group were recalled. The higher mortality rates in the Negroes and the consequent removal of these cases from the Negro population in the early years of life may account for the lower prevalence of tuberculosis in the later ages.

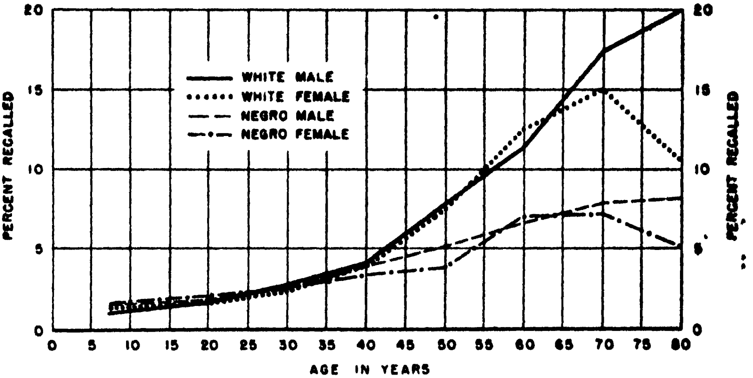

Figure 6. Percent of X-rayed population recalled as "tuberculosis" or "suspected tuberculosis" on 70-mm. film, by age, race, and sex; Muscogee County survey, 1946.

In both races the female recall rate for persons under 25 years of age is higher than the male. The Negro female rate continues to be higher than the male until age 35. After that, in both white and Negro, the male rates are higher with the exception of the 55–64 age group. However, in no age groups is the difference between the male and female rates statistically significant. The rise in the recall rates with age is probably due to the accumulation of infections through more years of life, and to the exposure to a higher prevalence of tuberculosis in preceding years (*3*).

The numbers in the recall group will, of course, depend on the reader, and in this survey the second reader increased the number recalled by 46 percent. However, the readings of the 70 mm. films by the two chest physicians on this study indicated that each reader recalled about the same percent of suspects—that is, the group read as negative by the first but suspect by the second corresponds in size to the group read as suspect by the first and negative by the second.

14″ x 17″ Findings

The "to be followed" group includes all those who, on the basis of the initial large films and a clinical history,[6] are to be followed regularly in the clinic. Here again the two readings of the 70 mm. films and the two readings of the 14″ x 17″ films have increased the number placed in this group. Figure 7 shows percentages and table 7 shows numbers and percentages from the X-rayed population forming the "to be followed" group by age, race and sex. The differences between the races follow the same general pattern as in the 70 mm. film "recall" groups. 1.7 percent of all whites X-rayed are "to be followed"; 1.2 percent of the Negroes are also "to be followed." In the 15–24 age group the difference between the white and Negro races in prevalence rates is statistically significant. In fact, in these years, over twice as many cases were found in the Negro population as in the white despite the fact that Negroes comprise only 44 percent of those X-rayed in this age group. Between 25 and 44 years of age there was little difference between the races. But after 45, the difference increased, the white "to be followed" rate becoming higher than the Negro. In the 65–74 age group 10 percent of the white males were to be followed and 8 percent of the white females were also included for follow-up. But only 5 percent of Negro males and 3 percent of Negro females in the same age group were in need of supervision.

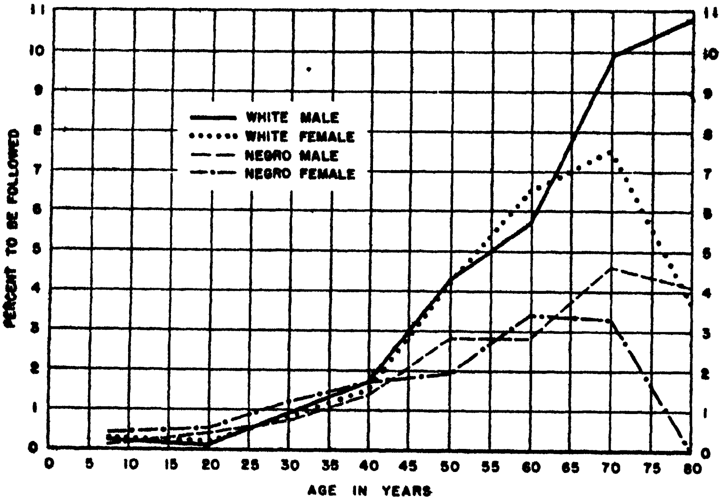

Figure 7. Percent of the X-rayed population to be followed as "tuberculosis" or "suspected tuberculosis" after clinical examination and a 14″ x 17″ film; Muscogee County survey, 1946.

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[6] In many cases other forms of clinical, radiographic and laboratory examinations were also used.

Table 7.—Number and percent of the X-rayed population to be followed as "tuberculosis" or "suspected tuberculosis" after clinical examination and a 14" x 17" film; Muscogee County survey, 1946

Age	Total			White male		
	Number X-rayed	Number to be followed	Percent to be followed	Number X-rayed	Number to be followed	Percent to be followed
Total	51,940	787	1.5	13,601	269	2.0
Under 15 years	3,926	11	0.3	1,147	3	0.3
15–24	13,482	37	.3	2,813	3	.1
25–34	13,496	123	.9	3,342	29	.9
35–44	10,699	172	1.6	2,933	51	1.7
45–54	6,238	217	3.5	1,921	82	4.3
55–64	2,822	143	5.1	1,000	57	5.7
65–74	1,066	74	6.9	374	37	9.9
75 and over	181	10	5.5	65	7	10.8
Not stated	30			6		

Age	White female			Negro male			Negro female		
	Number X-rayed	Number to be followed	Percent to be followed	Number X-rayed	Number to be followed	Percent to be followed	Number X-rayed	Number to be followed	Percent to be followed
Total	16,711	252	1.5	10,062	121	1.2	11,566	145	1.3
Under 15 years	1,256	4	0.3	761	1	0.1	762	3	0.4
15–24	4,719	8	.2	2,558	9	.4	3,392	17	.5
25–34	4,380	36	.8	2,593	19	.7	3,181	39	1.2
35–44	3,373	51	1.5	2,144	31	1.4	2,249	39	1.7
45–54	1,827	76	4.2	1,241	35	2.8	1,249	24	1.9
55–64	855	56	6.5	493	14	2.8	474	16	3.4
65–74	266	20	7.5	217	10	4.6	209	7	3.3
75 and over	28	1	3.6	49	2	4.1	39		
Not stated	7			6			11		

The differences between the percent of white males and females to be followed behave similarly to the sex differences revealed by 70 mm. findings. Of the white males, 2 percent were to be followed; 1.5 percent of the white females were to be followed. The differences in the age specific rates were not statistically significant. In the Negro population the female rate stays above the male rate until after 45 years of age, but differences between the age specific rates in the two sexes are likewise not statistically significant. For all ages the percents of males and females to be followed did not differ among the Negroes.

The proportion of the 70 mm. "recall" group which is to become the "to be followed" group after a 14" x 17" has been taken does not show a significant variation by race and sex. On the other hand, an extremely interesting variation by age was found. Table 8 shows that 49 percent of the total recalls were to be subsequently followed. Only 21 percent under 25 years remained in the follow-up group. Between 25 and 44 years, 47 percent were to be followed. Among persons 45 to 64 years of age 60 percent needed supervision and over 65 years, 63 percent were to be followed. It has been suggested that this increase with age can perhaps be explained by the prominence of vascular markings in the upper lung fields in young adults which often cannot be easily differentiated from small infiltrates on the miniature film. It may also be speculated that in the older age groups the prevalence of generalized pulmonary fibrosis increases and this often cannot be readily distinguished from tuberculosis by radiographic examination.

Table 8. *Number and percent of "recalls" on 70 mm. film who are still to be followed as "tuberculosis" or "suspected tuberculosis" after initial 14" x 17" film, by age*

Age	Number recalled and re-X-rayed	Number to be followed	Percent to be followed
Total	1,603	787	49.1
Under 25	232	48	20.7
25–44	634	295	46.5
45–64	603	360	59.7
65 and over	134	84	62.7

The inclusion of suspects found by a second reader has the effect of lowering the proportion of recalls who will need follow-up. As might be expected, a film called T or S by both readers turned up in the "to be followed" group 2.5 times as often as a film called T or S by only one reader. Using two readers in this study has doubled the number in the "one reader only" positive groups, and consequently has weighted the recalls with those less likely to need follow-up.

Included in the diagnosed cases from the survey are cases of tuberculosis already known to the health department and cases previously diagnosed but not known to the health department. Of the total 787 cases or suspects in the "to be followed" group, 129 or 16 percent gave a history of a previous diagnosis of tuberculosis. Nineteen percent of the whites and 12 percent of the Negroes admitted a previous diagnosis had been made. An industrial survey in Columbus in 1943 had brought to light many of these cases.

After the first 14" x 17" film and clinical history were obtained, hospitalization was recommended for 50 patients, 6 percent of the group to be followed, one of the immediate values of a mass case finding program. In 28 instances, evidence of positive sputum was obtained at the time of the initial 14" x 17" film. Minimal cases comprised 80 percent of the diagnosed group and 57 percent of the total group was read as inactive on the first film. The minimal group particularly was increased by the second readings of both the 70 mm. and the 14" x 17" films.

Comparison of Radiographic Findings in Industrial and Public Stations

It has been suggested that among employed people, particularly those in industry, tuberculosis is more prevalent than among the general population (4). The X-ray stations in this survey were separated into three groups—industrial, school, and public. The separation is not clear-cut, for some industrial workers were probably X-rayed in public stations because they had missed the industrial survey, belonged to a small nonsurveyed industry, or were not currently employed in factories. It seems reasonable to assume, however, that the group X-rayed in public stations is not preponderantly an industrially employed group.

There appears to be no difference in the percentage of whites recalled in industrial stations and in public stations. Of all white males, 4.7 percent were recalled in both. The rates of recall by age show no differences. The same statement is applicable to the "recalls" of white females; 3.8 percent were recalled in both groups.

Among Negroes, however, there were differences between those recalled from industrial and from public stations. Of the males X-rayed in public stations, 3.2 percent were recalled, but only 2.7 percent from industries. Of the Negro females X-rayed in public stations, 3 percent were recalled, but in industry, only 1 percent. However, only 10 percent of all Negroes were X-rayed in industrial stations. It may be that Negroes are more carefully selected for industrial employment because comparatively few are employed.

Since only 49 percent of the "recalls" were actually diagnosed as tuberculosis or suspected tuberculosis on a 14" x 17" film, comparison of prevalence as determined by the large film will be more useful. The total rates for white males were the same in both industrial and public groups (2.1 percent). The age specific rates are not significantly different except among those over 65 years for whom the industrial rate is the lower. The total rates for white females do not differ significantly, but the age specific rates, also not significantly different, are consistently higher in the industrial group. In public stations 1.6 percent were to be followed as compared with 1.7 percent in industries. The 14" x 17" findings for Negroes are lower in industries, than in public groups, following the pattern of the 70 mm. recalls. Of the Negro males X-rayed in public stations, 1.3 percent were to be followed as compared with 1 percent in industries. Of the Negro females X-rayed in public stations, 1.3 percent were to be followed, but in industries only 0.6 percent.

Radiographic Findings by District

Socioeconomic conditions appeared to be a factor in the survey coverage, for the response to the survey was better from the poorer districts. The next step is to determine the prevalence of tuberculosis in these twelve geographic districts of the county. Table 9 shows the percentage of the X-rayed over 15 years of age who were placed in the "to be followed" group, by district and by race. Figures 8 and 9 show the percentages by districts for white and Negro races.

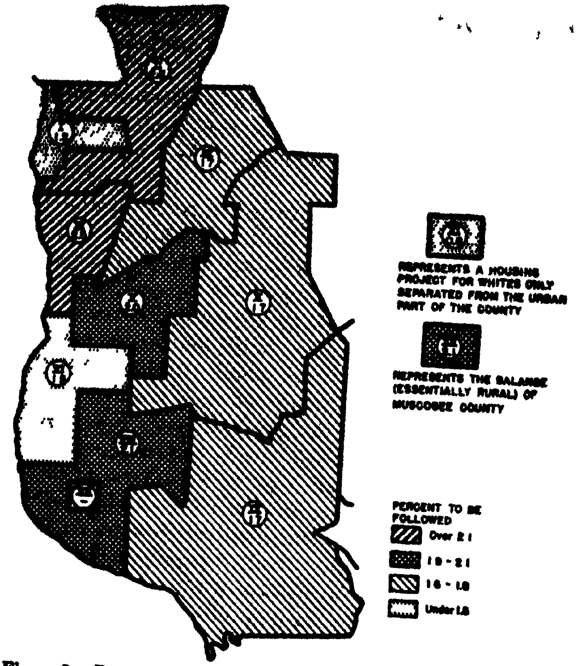
REPRESENTS A HOUSING PROJECT FOR WHITES ONLY SEPARATED FROM THE URBAN PART OF THE COUNTY
REPRESENTS THE BALANCE (ESSENTIALLY RURAL) OF MUSCOGEE COUNTY
PERCENT TO BE FOLLOWED
Over 2.1
1.9 - 2.1
1.6 - 1.8
Under 1.6

Figure 8. Percent of X-rayed white population over 15 years of age to be followed as "tuberculosis" or "suspected tuberculosis," shown by 12 districts; Muscogee County survey, 1946.

Among the white population in district I, the low rent industrial housing project where the largest percentage was X-rayed, only 1.2 percent are now being followed. Districts II and III, the next in order of X-ray coverage, are the poorest in housing conditions and are the highest two in prevalence of tuberculosis with 2.2 and 2.5 percent respectively, being placed in the "to be followed" group. District XII which is made up of rural sections of the county and district VIII had prevalence rates of 2.1 percent. Another mixed area, district V, with some substandard sections, had a rate of 2 percent and in this district, 48 percent were known to have been X-rayed. Except for district XII and district VIII (2.1 percent) the districts with the smaller percentages X-rayed had prevalence rates under the mean of 1.9 percent. The Army housing project, district XI, had the best record since only 0.8 percent were in need of further follow-up, but this is probably explained by the fact that most of these people were young adults.

Among the Negroes there seems to be no relationship between the percent X-rayed in the district and the prevalence of tuberculosis as

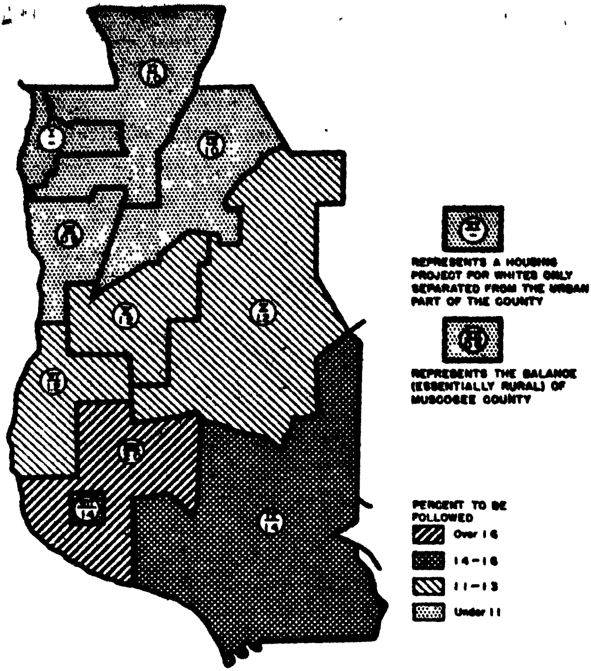
REPRESENTS A HOUSING PROJECT FOR WHITES ONLY SEPARATED FROM THE URBAN PART OF THE COUNTY
REPRESENTS THE BALANCE (ESSENTIALLY RURAL) OF MUSCOGEE COUNTY
PERCENT TO BE FOLLOWED
Over 16
14-16
11-13
Under 11

Figure 9. Percent of X-rayed Negro population over 15 years of age to be followed, shown by 12 districts; Muscogee County survey, 1946.

found among those X-rayed. In district VIII, which is probably one of the poorest Negro sections and where 29 percent of those X-rayed live, 2.0 percent are being followed. In the housing projects, district

Table 9. *Number and percent of X-rayed population over 15 years of age to be followed as "tuberculosis" or "suspected tuberculosis" by district and race; Muscogee County survey, 1946*

District	White			Negro		
	Number X-rayed	Number to be followed	Percent to be followed	Number X-rayed	Number to be followed	Percent to be followed
I	1,931	23	1.2	8	----------	----------
II	3,837	83	2.2	778	8	1.0
III	3,243	80	2.5	794	7	0.9
IV	2,557	43	1.7	413	4	1.0
V	2,569	53	2.0	3,061	38	1.2
VI	2,004	30	1.6	324	4	1.2
VII	----------	----------	----------	1,214	17	1.4
VIII	872	18	2.1	5,426	107	2.0
IX	1,225	21	1.7	3,502	49	1.4
X	2,602	43	1.7	256	3	1.2
XI	650	5	0.8	----------	----------	----------
XII	2,910	62	2.1	2,467	14	.6
Total	24,400	461	1.9	18,242	251	1.4

VII, the prevalence of tuberculosis is close to the mean prevalence of 1.4 percent. There appears to be the least tuberculosis among Negroes in district XII, the rural district in which only 0.6 percent of the surveyed are being followed.

Estimated Prevalence of Tuberculosis in the Total Population

The findings in the group X-rayed may or may not be representative of the entire county. Persons with previous diagnoses of tuberculosis may not feel it necessary to be X-rayed during a survey. Those who have had contact with tuberculosis and fear the disease may refuse to be X-rayed. These factors might indicate a higher prevalence among those not X-rayed. However, if there is more tuberculosis among those living under the poorest economic conditions but who responded to the survey better, then there may be less tuberculosis in the groups refusing X-rays. In this county it appears that among the whites there is less tuberculosis in the better economic sections and that these sections weight the non-X-rayed group more heavily. The age distributions of the X-rayed and the non-X-rayed differ, and since age specific rates differ, this may change the number of cases to be expected in the unexamined group. Assuming that there is no difference in the prevalence of tuberculosis in those X-rayed and those not X-rayed, an estimate has been made (table 10) of the number of cases which might be found in the total population if the rates by age, race and sex in the X-rayed group were applied to the total group. If the total population had been X-rayed and if the above assumption were correct, 2.3 times as many cases would now be followed among the whites and 1.3 times as many among the Negroes.

Table 10. *Estimate of the number of cases and suspects expected if the age, race, and sex rates for the X-rayed population are applicable to the total population*

Age	Total		White male		White female		Negro male		Negro female	
	To be followed group	Expected group	To be followed group	Expected group	To be followed group	Expected group	To be followed group	Expected group	To be followed group	Expected group
Under 15 years	11	73	3	24	4	28	1	5	3	16
15-24	33	40	3	4	6	12	8	8	16	16
25-34	110	174	22	59	34	58	18	18	36	39
35-44	161	233	47	86	47	75	28	29	39	43
45-54	191	328	69	129	69	135	34	35	20	29
55-64	124	276	44	100	52	135	12	16	16	25
65-74	72	212	34	89	20	90	10	17	8	16
75 and over	9	51	6	30	1	16	2	5		
Not stated										
Total	711	1,387	228	521	233	549	113	133	138	184

Reasons for Refusing Survey Examination

Emphasis has been placed on the practical advantages of carrying out community-wide X-ray surveys in a short period of time (*5*). For groups working toward a 100 percent participation in a survey, it is of primary importance to know the best methods of securing the cooperation from the community and these methods may be influenced by a knowledge of why individuals or groups fail to be surveyed. Letters inviting non-X-rayed adults to have their chest X-rays at the health center were sent out after the census. Both the Venereal Disease Division of the Georgia State Health Department and the Public Health Service felt that this was an excellent opportunity to find out some of the reasons for poor response, and undertook to interview those who responded to the letters. It was expected that it would be difficult to persuade this group to be examined, since they had apparently resisted the publicity at the time of the survey. Of 35,000 persons to whom letters were mailed, about 3,000 responded for X-rays and 2,394 of these were interviewed. In addition, there were 472 interviews by telephone or field visit. Of the 2.3 percent recalled for large films on the basis of one reading, 66 percent were called "tuberculosis" or "suspected tuberculosis" on the large film by the same reader. The prevalence rate was 1.5 percent, slightly lower than the white survey rate when based upon the findings of two readers, but higher than the white survey rates when based on one reader only. The group to whom letters were sent was weighted with white persons since their response to the survey had been poorer.

The group responding to the letter is probably not representative of the unexamined group, since presumably they were the more cooperative. Altogether there were 2,866 people interviewed among whom 7 percent were not living in Columbus at the time of the survey. Of those who were in Columbus at that time, 14 percent claimed one year later that they had not known about the blood-testing and X-ray program, but nearly 85 percent stated that they were either out of town or in military service at the time of the survey.

There were 2,369 interviews sufficiently completed to allow tabulations of the answers. Many of the reasons people gave for not having an X-ray were not specific and might be called indifference, for 30-percent gave no suitable answer at all or only a statement of "too busy," 15 percent claimed to have been out of town, and 9 percent stated they were in military service at that time. Nineteen percent claimed to have had a recent examination and 7 percent said that they were under the care of a private physician. Eighty-five people or 3.6 percent thought they were too old to need an X-ray. Nine or 0.4 percent were known cases of tuberculosis who saw no need for going through survey procedures. Nine percent were in hospitals, or physically unable to leave home at that time. The reasons and the frequency with which they were given are listed in table 11 by race and sex.

survey were questioned about their reasons for failing to be examined at that time. These reasons and the frequency of their occurrence have been listed for the benefit of those planning community-wide surveys.

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A Comparison Between Histoplasmin and Blastomycin by the Collodion Agglutination Technique[1]

By Samuel Saslaw, Captain, MC, AUS, and Charlotte C. Campbell, *Bacteriologist*

Two distinctly different types of tests for the detection of antibodies in immune rabbit sera against *Histoplasma capsulatum* have been described in previous reports from this laboratory. In one, yeast phase antigens of *H. capsulatum* were employed in complement fixation studies (*1*, *2*). In the other, antibodies against histoplasmin, a filtrate of the mycelial phase of *H. capsulatum*, were demonstrated by means of the collodion agglutination technique (*3*). The latter study showed that collodion particles sensitized with histoplasmin were agglutinated by specific sera but did not react with sera prepared against *Blastomyces braziliensis*, *Candida albicans*, *Sporotrichum schenckii*, or with normal rabbit sera. Weak or doubtful reactions, however, were obtained in low dilutions of sera prepared against *Blastomyces dermatitidis*. In the complement fixation studies, this cross reaction between *B. dermatitidis* and *H. capsulatum* was found to occur with the relationship more pronounced in the presence of blastomyces antigens than when histoplasma antigens were used.

The following experiments were therefore designed to determine (1) if, by means of the collodion agglutination test, a similar relationship could be shown to exist between histoplasmin and blastomycin, and

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[1] From the Department of Bacteriology, Army Medical Department Research and Graduate School.

(2) if different lots of histoplasmin from various sources were equally applicable to the test. Five lots of histoplasmin in addition to the single lot (H–40) (*5*) which was employed in the first report were compared.

Materials and Methods

The collodion particles used in this study were prepared according to the method of Cavelti (*4*). The test proper was conducted exactly as described in an earlier report (*5*). Optimal dilutions of the blastomycin and each of the various lots of histoplasmin were used to sensitize the collodion particles. Agglutinations were considered 4+ when the diameter of the flakes was 1 to 1½ mm. or more, with decreasing gradations of 3+ and 2+ being recorded with a corresponding decrease in the size of the particles and an increase in cloudiness of the suspending menstruum. The particles in a 1+ reaction were very fine but still readily visible. A test was considered doubtful (±) when particles were just barely visible and negative when no particulate matter was observed after resuspension. The immune rabbit sera were prepared as previously noted (*1*).

Results

Comparison of histoplasmin preparations.—The optimal dilution of five lots of histoplasmin (H–17,[2] 37,[2] 38,[2] 39,[2] and AMS–1 [3]) were determined by titration in the presence of immune rabbit sera and compared with that of the previously reported lot H–40 [3] (*5*). All of the preparations sensitized collodion sufficiently to obtain clear-cut agglutinations. The optimal dilutions of the stock solutions of H–17, 37, 38, 39, and AMS–1 were found to be 1:300, 1:100, 1:100, 1:200 and 1:300, respectively, (table 1) while the optimal dilution of lot H–40, as in the previous report, was found to be 1:200. The titers of the same serum against the different lots was 1:160 except that in the presence of H–17 a 1:320 dilution of serum agglutinated the sensitized particles. The above results indicate that different lots of histoplasmin can be readily adapted to the collodion agglutination test by previous determination of the optimum dilution of each lot.

Comparison of histoplasmin and blastomycin.—As noted in table 2 reactions of homologous and heterologous sera were compared in the presence of collodion sensitized with optimal dilutions of histoplasmin (H–40) and blastomycin (B–7).[3] In part A, agglutination of histoplasmin-coated particles was noted with all histoplasma antisera (G–2, G–5, G–6) in varying titers, but no positive reactions were

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[2] Kindly furnished by Dr. Arden Howell, Jr., Public Health Service, Duke University, Durham, N. C.

[3] Prepared at the Army Medical Department Research and Graduate School.

Table 1. *Comparative optimal dilution determinations of different histoplasmin lots using serum prepared in rabbits against the G-2 strain of* H. capsulatum

Lot No.	Dilution of histoplasmin [1] 0.5 ml.	Positive serum dilutions 0.5 ml.					Controls [2]	
		1:20	1:40	1:80	1:160	1:320	Antigen	Serum
H-17	1:100	1+	±	−	−	−	−	−
	1:200	3+	2+	1+	±	−	−	−
	1:300 [3]	4+	4+	4+	3+	1+	−	−
	1:400	4+	4+	4+	2+	1+	−	−
	1:500	4+	4+	4+	1+	1+	−	−
	1:600	4+	4+	3+	2+	±	−	−
	1:700	3+	2+	1+	−	−	−	−
	1:800	2+	1+	1+	−	−	−	−
H-37	1:25	3+	3+	2+	−	−	−	−
	1:50	3+	3+	2+	−	−	−	−
	1:100 [3]	4+	4+	4+	2+	−	−	−
	1:200	4+	2+	1+	−	−	−	−
	1:400	1+	1+	−	−	−	−	−
	1:800	1+	±	−	−	−	−	−
H-38	1:50	4+	4+	3+	±	−	−	−
	1:100 [3]	4+	4+	4+	3+	±	−	−
	1:200	4+	4+	3+	1+	−	−	−
	1:300	4+	4+	2+	1+	−	−	−
	1:400	3+	1+	1+	−	−	−	−
	1:800	±	−	−	−	−	−	−
H-39	1:25	1+	±	−	−	−	−	−
	1:50	3+	1+	±	−	−	−	−
	1:100	3+	3+	1+	±	−	−	−
	1:200 [3]	4+	3+	3+	1+	−	−	−
	1:300	4+	3+	1+	1+	−	−	−
	1:400	4+	2+	1+	−	−	−	−
	1:800	2+	1+	±	−	−	−	−
AMS-1	1:10	1+	±	−	−	−	−	−
	1:100	2+	1+	−	−	−	−	−
	1:200	4+	1+	±	−	−	−	−
	1:300 [3]	4+	2+	2+	1+	−	−	−
	1:400	3+	2+	1+	±	−	−	−
	1:500	2+	1+	−	−	−	−	−
	1:600	±	−	−	−	−	−	−

[1] Dilution of histoplasmin before mixture with equal quantity of collodion with a turbidity equal to No. 2 McFarland nephelometer.

[2] In antigen control sensitized particles were mixed with 0.5 ml. of saline. In serum control positive serum (1:20) was mixed with unsensitized collodion. Normal rabbit serum was similarly titrated as above and was negative throughout.

[3] Optimal dilution.

obtained with the sera of rabbits immunized with *B. braziliensis*,[4] *C. neoformans*,[4] *C. albicans*,[4] *S. schenckii*,[4] or with normal rabbit sera. The sera of 2 (No. 13 and No. 19) of 4 rabbits immunized with the A-1 and A-5 strains of *B. dermatitidis* weakly agglutinated the particles in dilutions of 1:5 and 1:10. These observations were essentially in accord with those previously reported from this laboratory (*3*).

The results obtained in the presence of blastomycin-treated particles are recorded in part B of table 2. As noted in earlier studies, the antibody response to *B. dermatitidis* was weak with titers of only 1:5 to 1:10 being obtained with the specific sera of any of the 4 rabbits studied (Nos. 13, 14, 15, 19). In none of these did the agglutinations become stronger than 1+ or 2+. By contrast, blastomycin-treated particles with histoplasma antisera gave positive reactions in dilutions varying from 1:5 to 1:80, many of which were of 4+ intensity. These titers, however, were usually less than those observed in the specific reaction between histoplasmin and histoplasma antisera (compare A and B in table 2). None of the other fungal antisera agglutinated the particles in the presence of blastomycin with the exception of a 1+ reaction with a 1:5 dilution of serum from rabbit No. 20 immunized with *S. schenckii.*

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[4] Since there are no standardized products from these organisms similar to histoplasmin, determinations of specific titers in terms of collodion agglutination tests were not possible. However, these sera were shown to contain antibodies by means of the complement fixation test with *S. schenckii*, *C. albicans*, *B. braziliensis* and *C. neoformans* exhibiting titers of 1:320, 1:40, 1:80 and 1:10, respectively.

Table 2. *Comparative results of collodion agglutination test with rabbit sera in the presence of histoplasmin and blastomycin*

Sera	Rabbit No.	A Collodion plus histoplasmin (H-40) Serum dilutions—0.5 ml.							B Collodion plus blastomycin B-7) Serum dilutions—0.5 ml.					
		1:5	1.10	1:20	1.40	1·80	1 160	1.320	1:5	1.10	1.20	1:40	1:80	1:160
G-2 *H. capsulatum*	1	4+	4+	4+	3+	3+	2+	–	4+	4+	4+	3+	1+	–
Do	3	2+	±	–	–	–	–	–	1+	–	–	–	–	–
Do	4	2+	1+	1+	–	-	–	–	2+	–	–	–	–	–
G-5 *H. capsulatum*	6	4+	4+	3+	3+	1+	–	–	4+	4+	2+	–	–	–
G-6 *H. capsulatum*	9	2+	1+	–	–	–	–	–	2+	1+	±	–	–	–
A-1 *B. dermatitidis*	13	1+	±	–	–	–	–	–	1+	1+	±	–	–	–
Do	14	–	–	–	–	–	–	–	1+	1+	±	–	–	–
A-5 *B. dermatitidis*	15	–	–	–	–	–	–	–	1+	±	–	–	–	–
Do	19	1+	1+	±	–	–	–	–	2+	1+	–	–	–	–
B-3 *B. braziliensis*	17	–	–	–	–	–	–	–	–	–	–	–	–	–
Do	18	–	–	–	–	–	–	–	–	-	–	–	–	–
C. neoformans	26	–	–	–	–	–	–	–	–	–	–	–	–	–
S. schenckii	19	±	–	–	–	–	–	–	–	–	–	–	–	–
Do	20	±	–	–	–	–	–	–	–	–	–	–	–	–
C. albicans	22	–	–	–	–	–	–	–	–	–	–	–	–	–
Do	23	–	–	–	–	–	–	–	–	–	–	–	–	–
Normal rabbit sera	----	–	–	–	–	–	–	–	–	–	–	–	–	–

Discussion

The data presented here demonstrate that different lots of histoplasmin may be readily adapted to the collodion agglutination test by the previous determination of optimal dilutions. Six different lots of stock histoplasmin have been shown to yield comparable results in the presence of specific immune serum. Blastomycin, which like histoplasmin is a filtrate of the mycelial phase of the organism, can also be adapted to the collodion agglutination technique. Whereas histoplasma antiserum caused strong agglutination of histoplasmin-sensitized particles, blastomyces antisera only weakly agglutinated collodion treated with blastomycin. The comparatively low potency of blastomyces antisera has been previously noted in complement fixation studies from this laboratory and has been attributed to the apparently weaker immunogenic capacity of *B. dermatitidis.*

This factor was further brought out when homologous and heterologous sera were allowed to react with collodion sensitized with either histoplasmin or blastomycin. In the presence of histoplasmin, specific sera more readily agglutinated the collodion while blastomyces antisera caused agglutination in 2 of 4 cases and then only weakly in low titer. On the other hand, histoplasma antisera strongly agglutinated collodion particles sensitized with blastomycin and, although usually not in as high dilution as when histoplasmin was used as antigen, in higher titer than the apparently weak specific blastomyces antisera.

This observation is in accord with our previous studies with yeast phase antigens in complement fixation wherein higher titers against *B. dermatitidis* antigens were obtained with *H. capsulatum* sera than with specific sera. Such cross reactions have been previously discussed and again suggest the value of using both *H. capsulatum* and *B. dermatitidis* antigens in evaluating antibody responses to either of these agents. In this way a more comprehensive and critical evaluation of the test proper and of the derived results may be obtained.

Summary

1. Collodion particles sensitized with either histoplasmin or blastomycin were employed in agglutination studies. Specific histoplasma rabbit sera strongly agglutinated collodion suspensions sensitized with histoplasmin and also reacted with blastomycin-treated particles to a lesser degree.

2. *B. dermatitidis* antisera reacted in low dilutions with blastomycin-coated particles and gave weaker or negative agglutination reactions when histoplasmin was used as antigen.

3. Rabbit sera prepared against *B. braziliensis*, *S. schenckii*, *C. neoformans*, and *C. albicans* as well as normal sera did not, as a rule, agglutinate collodion particles sensitized with either histoplasmin or blastomycin.

4. Six different lots of histoplasmin were compared and found applicable to the collodion agglutination test.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 12, 1949

A seasonal increase was recorded in the incidence of measles of 2,637 cases (15 percent, from a total of 17,685 last week to 20,322 currently), as compared with an increase of 4,572 cases (24.5 percent, from 18,648 to 23,220) reported for the corresponding week in 1944, the latter figure being the largest corresponding figure of the past 5 years. The 5-year (1944–48) median is 11,260. Currently, increases were recorded in all of the 9 geographic divisions except the Mountain area. Of 16 States reporting more than 500 cases each, 8 reporting more than 700 each are as follows (last week's figures in parentheses): Maine 753 (486), Massachusetts 1,308 (1,391), New York 1,385 (1,315), Pennsylvania 1,422 (1,402), Maryland 1,195 (1,127), Virginia 861 (827), Texas 3,020 (2,456), and California 1,248 (655). The total reported to date this year is 89,615, corresponding period in 1944, 91,719 (highest of the past 5 years), 5-year median, 39,542.

A slight decline in the incidence of influenza was reported. The total for the week is 4,905, last week 5,170, 5-year median 8,846. The 4 States reporting more than 177 cases each are Virginia 431 (last week 437), South Carolina 652 (last week 663), Arkansas 294 (last week 155), Texas 2,612 (2,794). The total for the year to date is 27,416, same period last year (also the 5-year median) is 71,949.

Of 62 cases of poliomyelitis reported (last week 80, 5-year median 32), 16 occurred in California, 7 in Washington, and 4 each in New York and Idaho.

During the week 2 cases of anthrax were reported, in New York. Of 4 cases of smallpox, 2 occurred in Missouri and 1 each in South Dakota and Kansas

Deaths recorded during the week in 94 large cities in the United States totaled 10,057, as compared with 9,838 last week, 10,071 and 10,053, respectively, for the corresponding weeks of 1948 and 1947 and a 3-year (1946–48) medium of 10,071. The total for the year to date is 60,009, as compared with 63,203 for the corresponding period last year. Infant deaths recorded for the week totaled 672, last week 734, 3-year median 670. The cumulative figure is 4,151, same period last year 4,345.

Telegraphic case reports from State health officers for week ended Feb. 12, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [a]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	3	--------	--------	753	--------	18	--------	--------	12	--------	--------	--------	5	--------
New Hampshire	--------	--------	--------	37	--------	4	--------	--------	4	--------	--------	--------	--------	--------
Vermont	--------	--------	--------	408	--------	1	--------	--------	3	--------	--------	--------	3	--------
Massachusetts	9	1	--------	1,308	2	--------	--------	--------	328	--------	--------	--------	71	--------
Rhode Island	--------	--------	--------	193	--------	8	--------	--------	11	--------	--------	1	4	--------
Connecticut	2	--------	26	372	2	66	--------	--------	52	--------	--------	--------	3	--------
MIDDLE ATLANTIC														
New York	8	2	[b] 1	1,385	4	355	4	--------	[e] 269	--------	--------	1	126	4
New Jersey	4	--------	1	467	1	70	2	--------	138	--------	--------	--------	36	1
Pennsylvania	6	--------	(b)	1,422	3	--------	1	--------	--------	--------	--------	3	92	--------
EAST NORTH CENTRAL														
Ohio	3	--------	3	76	5	42	1	--------	354	--------	--------	4	63	22
Indiana	3	1	5	84	2	27	--------	--------	91	--------	--------	--------	21	17
Illinois	2	1	6	58	8	88	2	--------	189	--------	--------	--------	29	5
Michigan [d]	4	--------	10	512	5	43	--------	--------	353	--------	--------	5	46	5
Wisconsin	--------	--------	77	698	7	11	--------	--------	78	--------	--------	2	57	--------
WEST NORTH CENTRAL														
Minnesota	4	--------	--------	100	--------	6	2	--------	74	--------	--------	--------	2	--------
Iowa	--------	--------	2	42	1	3	1	--------	48	--------	--------	--------	5	8
Missouri	--------	--------	9	556	--------	28	--------	--------	34	2	3	3	7	--------
North Dakota	--------	--------	2	66	--------	--------	--------	--------	10	--------	--------	--------	9	--------
South Dakota	--------	--------	--------	11	--------	2	--------	--------	[e] 3	1	--------	--------	2	--------
Nebraska	--------	--------	10	33	--------	10	1	--------	16	--------	--------	--------	--------	--------
Kansas	2	--------	--------	607	--------	20	--------	--------	21	1	2	--------	7	--------
SOUTH ATLANTIC														
Delaware	1	--------	--------	19	--------	--------	--------	--------	9	--------	--------	--------	1	--------
Maryland [d]	7	--------	6	1,195	1	74	2	--------	[e] 38	--------	--------	2	6	--------
District of Columbia	3	--------	1	40	--------	15	--------	--------	10	--------	--------	--------	10	--------
Virginia	1	--------	431	861	3	147	2	--------	38	--------	1	--------	40	1
West Virginia	2	--------	35	270	--------	6	--------	--------	28	--------	--------	--------	13	--------
North Carolina	2	--------	--------	353	4	--------	[1] 2	--------	21	--------	2	4	30	--------

South Carolina	6		652	86	1	190	1		7				21	1
Georgia	6		22	315	4	28	2		6		6	1	4	10
Florida	9		9	109		20	3		3		2		11	3
EAST SOUTH CENTRAL														
Kentucky	12	1	59	504	5	57			88		1	1	57	17
Tennessee	6		63	186	4	124	1		41		1	2	19	
Alabama	8		125	646	2	104			12			1	5	10
Mississippi [d]	5	1	26	55		53			6		1		1	
WEST SOUTH CENTRAL														
Arkansas	9		294	300		126	3		4				11	
Louisiana			3	90		26			5		2	2	1	1
Oklahoma	1		71	289		44	2		26		1		4	1
Texas	23		2,612	3,020	12	683	2		61		3	1	179	22
MOUNTAIN														
Montana			7	42	1	1			21		1	1		
Idaho	3	1	11	40		12	4		[e] 24			2		
Wyoming				13		1			11					
Colorado	3		48	172		58			30				13	
New Mexico	1		1	108		16			28					
Arizona	7		177	133		45			5		1	1	13	
Utah [d]	2			97		2			3				6	
Nevada				1					2					
PACIFIC														
Washington			37	434	1	5	7		66					
Oregon	1		28	509		33	1		10			1	17	
California	18		35	1,248	7	64	16		85			3	72	8
Total	186	8	4,905	30,322	85	2,736	62		2,771	4	27	41	1,121	
Median, 1944–48	299	8	8,846	11,260	175		32		3,324	4	14	48	1,922	
Year to date 6 weeks	1,121	48	27,416	89,615	520	13,733	[1] 635	8	15,977	6	202	237	6,498	
Median, 1944–48	1,878	44	71,949	39,542	1,295		246	1	17,479	39	136	254	13,648	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week	6,235		63,686	142,008	1,364		[1] 27,962		38,675	21		3,356	16,826	
Median, 1943–48	9,444		115,507	65,666	2,799		13,617		56,050	115		4,490	30,065	

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[a] Including paratyphoid fever, reported separately, as follows: New York 1; Wisconsin 1; North Carolina 1; California 1; salmonella infections, not included, were reported as follows: Massachusetts 2; New York 1; Pennsylvania 1.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Period ended earlier than Saturday.

Anthrax: New York 2.

Smallpox: Missouri 2; South Dakota 1; Kansas 1.

[1] Correction: North Carolina, poliomyelitis, week ended January 22, 1 case (instead of 2)

Alaska: Influenza 96; measles 3; scarlet fever 1; streptococcus throat 3.

Territory of Hawaii: Influenza 28; measles 209; poliomyelitis 1; whooping cough 1.

PLAGUE INFECTION IN YAKIMA COUNTY, WASH.

Under date of February 7, plague infection was reported proved in a pool of 64 fleas from 53 short-tailed meadow mice, *Lagurus curtatus*, trapped January 20, 1949, on the U. S. Army firing range 10 miles northeast of Yakima, Yakima County, Wash.

DEATHS DURING WEEK ENDED FEB. 5, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Feb. 5, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,838	10,772
Median for 3 prior years	10,259	
Total deaths, first 5 weeks of year	49,952	53,132
Deaths under 1 year of age	734	754
Median for 3 prior years	751	
Deaths under 1 year of age, first 5 weeks of year	3,479	3,667
Data from industrial insurance companies:		
Policies in force	70,633,498	66,886,217
Number of death claims	14,328	14,027
Death claims per 1,000 policies in force, annual rate	10.6	11.0
Death claims per 1,000 policies, first 5 weeks of year, annual rate	9.8	11.2

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Weeks ended January 22 and 29, 1949.—During the weeks ended January 22 and 29, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Week ended Jan. 22, 1949

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		110		230	873	58	77	133	346	1,827
Diphtheria				31	1	1		3		36
German measles				50	21		5	9	5	90
Influenza		27				3			8	38
Measles		190	3	175	311	169	95	230	141	1,314
Meningitis, meningococcal					1			1		2
Mumps		18		143	178	44	31	52	119	585
Poliomyelitis		1		2		1			2	6
Scarlet fever		8		167	78	6	2	8	13	282
Tuberculosis (all forms)		15	3	104	35	8	8		28	201
Typhoid and paratyphoid fever				7				1	3	11
Undulant fever				2						2
Venereal diseases:										
Gonorrhea	1	18	9	99	51	23	12	38	124	375
Syphilis	1	10	18	87	48	11	12	6	12	205
Whooping cough		2		185	33	4	17		11	252

Week ended Jan. 29, 1949

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		70	3	343	752	39	80	139	356	1,782
Diphtheria				25	5	1		16	1	48
Dysentery, bacillary				1			1			2
German measles		1		77	24	4		15	12	133
Influenza		16			4	2			1	23
Measles		368	9	300	249	124	96	240	115	1,501
Meningitis, meningococcal					3					3
Mumps		42	2	72	322	39	24	36	97	634
Poliomyelitis				1					1	2
Scarlet fever		8	1	170	81	1	3	15	10	289
Tuberculosis (all forms)		6	9	100	22	13	7	21	31	209
Typhoid and paratyphoid fever				19	2				1	22
Undulant fever				3						3
Venereal diseases:										
Gonorrhea		11	13	100	59	21	23	37	97	361
Syphilis		16	15	87	37	9	2	4	19	189
Whooping cough				156	22	1	11	2		192

JAMAICA

Notifiable diseases—4 weeks ended January 29, 1949.—For the 4 weeks ended January 29, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	1	7	Leprosy		3
Diphtheria	2	5	Tuberculosis (pulmonary)	36	50
Erysipelas	1	1	Typhoid fever	4	66

NEW ZEALAND

Notifiable diseases—5 weeks ended December 31, 1948.—During the 5 weeks ended December 31, 1948, certain notifiable diseases were reported in New Zealand, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	11	1	Malaria	1	
Diphtheria	15		Ophthalmia neonatorum	1	
Dysentery:			Poliomyelitis	99	6
Amebic	2		Puerperal fever	4	
Bacillary	2		Scarlet fever	86	2
Encephalitis, lethargic	1		Tetanus	2	2
Erysipelas	14		Tuberculosis (all forms)	176	49
Food poisoning	9		Typhoid fever	7	1
Influenza	1	1	Undulant fever	3	

NORWAY

Notifiable diseases—November 1948.—During the month of November 1948, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	13	Mumps	521
Diphtheria	65	Paratyphoid fever	2
Dysentery, unspecified	2	Pneumonia (all forms)	2,440
Erysipelas	413	Poliomyelitis	24
Gastroenteritis	2,311	Rheumatic fever	106
Gonorrhea	387	Scabies	3,110
Hepatitis, epidemic	145	Scarlet fever	729
Impetigo contagiosa	3,323	Syphilis	102
Influenza	6,115	Tuberculosis (all forms)	402
Laryngitis	11,865	Weil's disease	1
Malaria	2	Whooping cough	873
Measles	2,909		

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month

Cholera

India—Calcutta.—During the week ended January 22, 1949, 219 cases of cholera with 68 deaths were reported in Calcutta, India, and during the week ended January 29, 169 cases with 59 deaths were reported.

Plague

Brazil.—For the period August 1–31, 1948, 99 cases of plague with 10 deaths were reported in Brazil. The total for the year to August 31, 1948, is 224 cases, 35 deaths.

India—Cawnpore.—During the week ended January 29, 1949, 8 cases of plague with 3 deaths were reported in Cawnpore, India.

Union of South Africa—Orange Free State.—During the week ended January 29, 1949, 1 fatal suspected case of bubonic plague was reported at Ellingham Farm, Koppies District, Orange Free State, Union of South Africa.

Smallpox

Bahrein Islands.—For the week ended January 29, 1949, 7 cases of smallpox were reported in Bahrein Islands.

Brazil.—For the period August 1–31, 1948, 117 cases of smallpox with 3 deaths were reported in Brazil, including 31 cases, 2 deaths, in Rio de Janeiro, 10 cases in Sao Luiz, and 8 cases in Salvador.

China—Amoy.—For the period January 11–20, 1949, 19 cases of smallpox were reported in Amoy, China.

Dahomey.—During the period January 21–31, 1949, 61 cases of smallpox with 7 deaths were reported in Dahomey, French West Africa.

Ecuador.—During the months September–November, 1948, an outbreak of smallpox was reported in Loja Province, Ecuador. Cases and deaths reported during the period are as follows: September 1–30, 1948, 303 cases, 20 deaths; October 1–31, 261 cases, 19 deaths; November 1–30, 112 cases, 11 deaths.

India—Ahmedabad.—Smallpox has been reported in Ahmedabad, India, as follows: Week ended January 15, 1949, 119 cases, 60 deaths; week ended January 22, 125 cases, 59 deaths.

Indochina (French)—Laos State—Luang-Prabang Province.—Smallpox has been reported in Luang-Prabang Province, Laos State, French Indochina, as follows: Week ended January 22, 1949, 464 cases, 232 deaths; week ended January 29, 86 cases, 41 deaths.

Korea.—For the period January 1–15, 1949, 135 cases of smallpox were reported in Korea, including 30 cases in Seoul.

Typhus Fever

Chile.—During the period August 15–September 11, 1948, 213 cases of typhus fever with 28 deaths were reported in Chile, including 6 cases 1 death in Antofagasta, 5 cases in Santiago, and 1 case in Talcahuano.

Korea.—During the period January 1–15, 1949, 23 cases of typhus fever were reported in Korea, including 1 case in Seoul.

Peru.—Typhus fever has been reported in Peru as follows: August 1–31, 1948, 235 cases; September 1–30, 223 cases.

Yellow Fever

Belgian Congo—Stanleyville Province.—During the period January 17–24, 1949, 1 fatal case of yellow fever was reported in the Paulis area in Stanleyville Province, Belgian Congo.

International Validity Periods For Immunization Certificates

The World Health Organization has advised member nations that certificates of immunization against cholera, smallpox and yellow fever are to be valid for the following periods:

Certificate	*Period of validity, reckoned from the date of immunization*
Cholera inoculation	7 days to 6 months
Smallpox vaccination	14 days to 3 years
Yellow fever inoculation	10 days* to 4 years

*Except in the case of persons reinoculated within 4 years.

These standards were set by the Quarantine Section of the World Health Organization's Expert Committee on International Epidemiology and Quarantine at its meeting in Geneva, Switzerland, November 18, 1948. They were adopted to clarify provisions of the International Sanitary Conventions of 1944.

The health authorities of the signatory nations are urgently requested to adhere to these periods to prevent confusion and administrative difficulties in connection with international travel.

* * *

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

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6 MAY 1949

Public Health Reports

VOLUME 64 MARCH 11, 1949 NUMBER 10

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Studies With Antibiotic-Producing Coliforms
Smallpox Vaccination During Pregnancy

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

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How the National Mental Health Act Works

By James V. Lowry, M. D.*

The National Mental Health Act was conceived by people who had a deep appreciation of the emotional difficulties of their fellow men. It came into being because it had the wide-spread support of people who wanted to see some action taken that would help resolve some of our problems. A number of acute pains are associated with the early growth and development. There are some differences of opinions of those greatly interested as to how rigid or permissive should be the control of this infant. Some ask why rigid Federal control of assistance activities is not extended to State and local activities. Others are reluctant to accept assistance because of a fear of control. There are those who feel that growth has been too slow, a few who think that a diagnosis of hyperpituitarian is indicated.

The National Mental Health Act provides for two separate and distinct types of activities—operational and assistance. The operational activities are those performed and directly controlled by the Public Health Service. They are limited to research in the National Institute of Mental Health, and demonstrations. The assistance activities are concerned with aiding agencies and individuals to perform projects over which the Public Health Service has no direct control. Assistance activities include research grants, training grants and grants for community services.

It is apparent that the chief purpose of the National Mental Health Act is to assist nonfederal agencies in the performance of their activities in the fields of research, prevention, and treatment. It was not intended to have the Federal Government assume authority and control over such activities. The National Mental Health Act is a mechanism which can be used to initiate or implement preventive and therapeutic services, to increase knowledge with regard to emotional disorders, and to increase the number of personnel trained in the

---

This paper was presented at the 39th Annual Meeting of the National Committee for Mental Hygiene, New York City, Nov. 3, 1948. It was originally published in Mental Hygiene 33: 30 (1949).

*Chief, Community Services Section, Mental Hygiene Division, Public Health Service.

fields related to mental health. It is a mechanism that can be used to implement a national mental health program which is the aggregate of all the programs of all the agencies whose activities relate to mental health. Such a national mental health program evolves from and is dependent upon participation of individuals and organizations of all types—local, county, State, national, private and public.

Operational Activities

To carry out the responsibilities for research under the National Mental Health Act, there is, at the present time, under construction on the grounds of the National Institutes of Health in Bethesda, Maryland, a clinical research center which will include the facilities of the National Institute of Mental Health. It is hopefully anticipated that the research center will be completed by 1950. In preparation for the opening of this Institute, the Public Health Service is supporting a number of research fellows, expecting that from the group it will be possible to obtain some of the staff of the Institute.

In addition to the research that will be carried on within the National Institute of Mental Health, there is a need for demonstration projects or field studies One such project, a clinic, is now in operation in Prince Georges County, Maryland This first project has as its general objective the study and investigation of the best methods of incorporating mental health services in a local public health program. Since 31 of the 53 agencies designated by the States to be the State Mental Health Authorities are health departments, and since 23 of these health departments had no mental health program prior to July 1947, it was important to have a demonstration of this particular type. In addition to the study of the best methods of incorporating mental health services in a local and State public health program, this project, because it was not committed to supplying all the clinical services demanded by the community, can engage in other areas of activity related to the field of mental health.

The usefulness of mental hygiene clinics as a therapeutic service has been demonstrated both satisfactorily and unsatisfactorily for about 20 years. These mental hygiene clinics have been overburdened by the number of patients needing treatment. Not only has it been impossible in most instances to satisfy the needs of a community with regard to treating the sick, but because of the lack of time and, in some cases, the narrowness of viewpoint, such clinics have been unable to do any significant amount of work of a really preventive nature. This is true if we regard prevention in its true sense and not in the sense of early treatment of someone already ill.

What can a clinic staff do that is of value in preventing mental illness? Would it be profitable for the staff to devote a considerable proportion of its time to the education of key community groups? One significant activity of this kind is being carried out by the nurse on the clinic staff. This nurse has had training in both public health nursing and in mental hygiene. Almost all of her time is spent outside the clinic working with public health nurses and mothers in prenatal and well-baby clinics. This nurse is not supplying therapeutic services for children with emotional problems, but the mothers and nurses are being given the opportunity to acquire an understanding of the emotional needs of children and to learn to handle adequately the everyday problems of the mother-child relationship. One can reasonably speculate that the incorporation of this kind of activity as a part of all prenatal and well-baby services might produce more emotionally healthy children who would never need clinical therapeutic services.

Another type of demonstration project sponsored by the Public Health Service during the past year was institutes for physicians. One such institute was held in Lexington, Kentucky, another in Richmond, Virginia, and a third in Denver, Colorado. These institutes, supported by demonstration funds, were undertaken with the objective of furnishing information on psychiatry to physicians in general practice. In two instances, the physicians attended a series of lectures and in the other institute, a limited number of physicians received didactic training and also worked with patients. Plans are being made for an institute for a limited number of pediatricians in Minneapolis. These institutes have been sponsored by the State Mental Health Authority and the State Medical Association in each location.

Assistance Activities

As stated, assistance procedures have to do with activities over which the Public Health Service has no direct control. Three types of grant programs are included— research grants, training grants, and grants for community services.

Figure 1 diagrams the procedures and the groups involved in the grant activities. Requests for grants-in-aid to the States for community services originate with the agency designated by each State to be the State Mental Health Authority. The program is sent to the District Office of the Public Health Service for approval. after which it is reviewed by the Mental Hygiene Division headquarters. The nonadministrative policies relating to the community services program are based in a large measure on recommendations of the National Advisory Mental Health Council and originate in the Community Services Committee of that Council. The amount of money available to each State is determined by a formula based by law on population, financial need, and extent of the problem. The State is required to match the Federal grant funds with State or local public funds expended for the same purpose. The matching requirements are $1 of State funds for each $2 of Federal funds.

Research grant requests originate with institutions, hospitals, or individuals and are sent to the Public Health Service. The project formulated is referred to the Research Committee, which, after study, makes its recommendation with regard to the project to the National Advisory Mental Health Council. If the Council approves the project, a grant can be made by the Service. The method of procedure on training grants, both for graduate and undergraduate grants and stipends, is similar to that for research grants.

The Public Health Service has consultative personnel on duty in most of the district offices to assist the States with advice on the formulation of programs, program content, and the other problems. It is also the responsibility of the consultants to conduct program reviews to ascertain the conformance with the plans on which grants were based, and the progress in carrying out such plans.

Research Grants

Table 1 summarizes the information with regard to grants for research and for research fellowships for the period July 1947 through September 1948. The difference between the total amount granted in fiscal 1949 and the amount available will be used for grants approved during the balance of the fiscal year which ends July 1949.

Table 1. *Research grants and fellowships*

Year	Grants	Amount	Fellows	Amount	Total
1948	38	$373, 664	20	$64, 822	$438, 486
1949	29	410, 443	7	26, 300	*436, 743

*Total available for 1949 is $570,000.

Training Grants

Table 2 summarizes the data with regard to grants for training and

Table 2. *Training grants and stipends—1948*

[illegible]	Grants	Amount	Stipends	Amount	Total
Psychiatry	22	$333, 450	81	$187, 010	$520, 460
Clinical psyc[illegible]	19	145, 600	40	64, 833	210, 433
Psychiatric [illegible] work	11	139, 595	50	72, 000	211, 595
Psychiatric [illegible]	10	126, 224	59	109, 600	235, 824
To[illegible]	62	744, 869	230	433, 443	1, 178, 312

stipends made during fiscal year 1948. These were for graduate training programs in psychiatry, psychiatric social work, clinical psychology, and psychiatric nursing. Table 3 summarizes the same information for fiscal year 1949.

Table 3. *Training grants and stipends—1949*

	Grants	Amount	Stipends	Amount	Total
Psychiatry	24	$406, 859	72	$234, 650	$643, 509
Clinical psychology	28	230, 710	55	95, 432	326, 142
Psychiatric social work	18	204, 280	62	111, 000	315, 280
Psychiatric nursing	16	158, 605	82	144, 961	303, 566
Totals	86	1, 002, 454	271	586, 043	1, 588, 497

Beginning July 1949, funds will be available for grants to medical schools for undergraduate training programs in psychiatry. Applications have been received and will be acted upon by the training committee and the council in December. The last Congress approved contract authorization for this purpose in order to provide continuity of the programs and assurance of continued support.

Grants to States

In accordance with the provisions of the National Mental Health Act, each State was requested to designate one agency that would formulate and be responsible for and have control of the State mental health program. This agency is called the State Mental Health Authority. The Public Health Service deals with this designated agency on all matters pertaining to the State program. Figure 2 shows the agencies designated by the States.

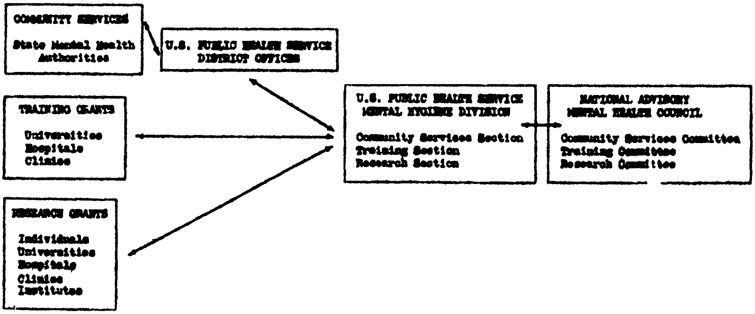
COMMUNITY SERVICES
State Mental Health Authorities
U.S. PUBLIC HEALTH SERVICE DISTRICT OFFICES
TRAINING GRANTS
Universities
Hospitals
Clinics
RESEARCH GRANTS
Individuals
Universities
Hospitals
Clinics
Institutes
U.S. PUBLIC HEALTH SERVICE MENTAL HYGIENE DIVISION
Community Services Section
Training Section
Research Section
NATIONAL ADVISORY MENTAL HEALTH COUNCIL
Community Services Committee
Training Committee
Research Committee

Figure 1. Grants procedure.

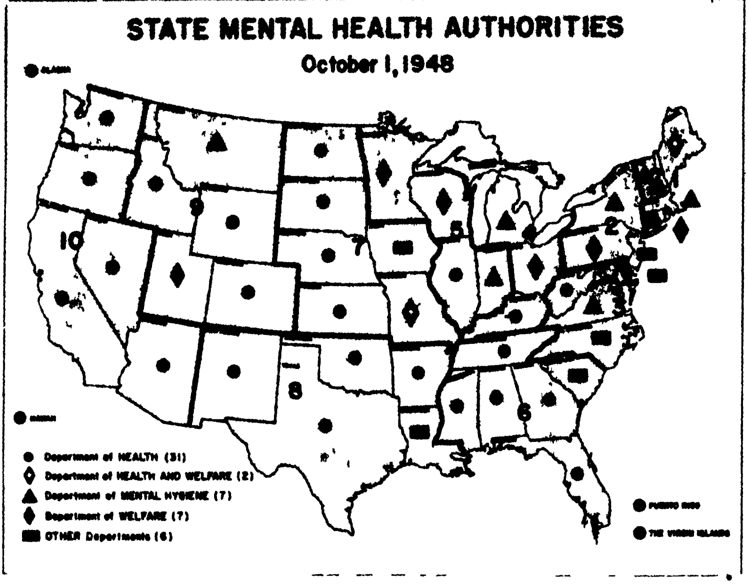
STATE MENTAL HEALTH AUTHORITIES
October 1, 1948
ALASKA
HAWAII
● Department of HEALTH (31)
◊ Department of HEALTH AND WELFARE (2)
▲ Department of MENTAL HYGIENE (7)
♦ Department of WELFARE (7)
■ OTHER Departments (6)
PUERTO RICO
THE VIRGIN ISLANDS
10
9
7
8
5
6
2

Figure 2.

Grant-in-aid funds became available in July 1947 and during the first year of operation, 46 States formulated programs and received grants.[1] It is particularly significant that of these 46, 24 had no program in the designated agency prior to July 1947. This means that the mental health program had received no official assistance, but had been recognized and when funds became available, action was taken.

Figure 3 indicates the types of activities included in the State programs that were proposed during fiscal year 1948. These activities group themselves into five categories—administrative, professional services, clinic services, preventive and educational services, and training.

Three million dollars were available for State grants-in-aid in fiscal 1948, and of this amount, plans were approved that carried budgets totalling $2,133,360. The amounts budgeted for the various categories of activities are shown in figure 4. The largest amount was for clinic services. The money budgeted for training was for the financial support of trainees who would return to work in the State mental health programs. The amount budgeted for preventive and educational activities is very small. Even if one recognizes that part of the function of the staff of clinic and other professional personnel is in this

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[1] Five States (Alabama, Indiana, Missouri, Pennsylvania, and Wyoming) and two territories (Puerto Rico and the Virgin Islands) did not submit plans.

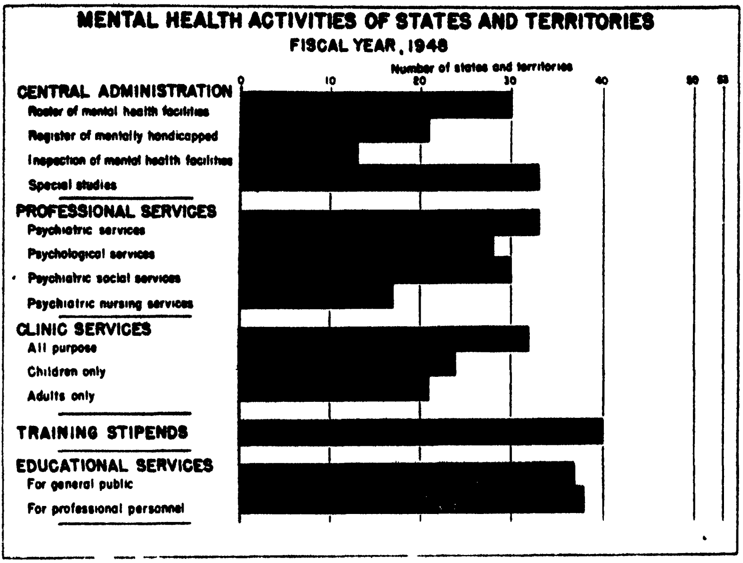

Figure 3.

field, it appears that too little attention is being paid to these activities.

One type of assistance given to the States is in the form of surveys of mental health facilities in the States. The paucity of this type of information is surprising. Each State survey requires from one week to a month to gather the data, and the Mental Hygiene Division has one medical officer who devotes his entire time to this activity.

Quarterly expenditure reports of the States indicate that there was considerable delay in initiating programs during the first year of operation. Only 19 States utilized funds during the first quarter. Many States were unable to formulate programs until later in the year, and seven States and territories were unable to do so at any time. As the year went on, more and more States utilized the funds budgeted and a total of $1,164,217 was expended and obligated (figs. 5 and 6).

A number of factors limited the amount of money that could be used in community service programs during this first year. There was the delay incident to formulating and initiating new programs; there was the difficulty of obtaining trained personnel because of shortages and low salaries; there was an inability to utilize funds because of the necessity for having employees under a merit system; in some States, legislation was required to permit the State mental health authority to reallocate funds to other agencies; there were delays in designating the responsible State agencies.

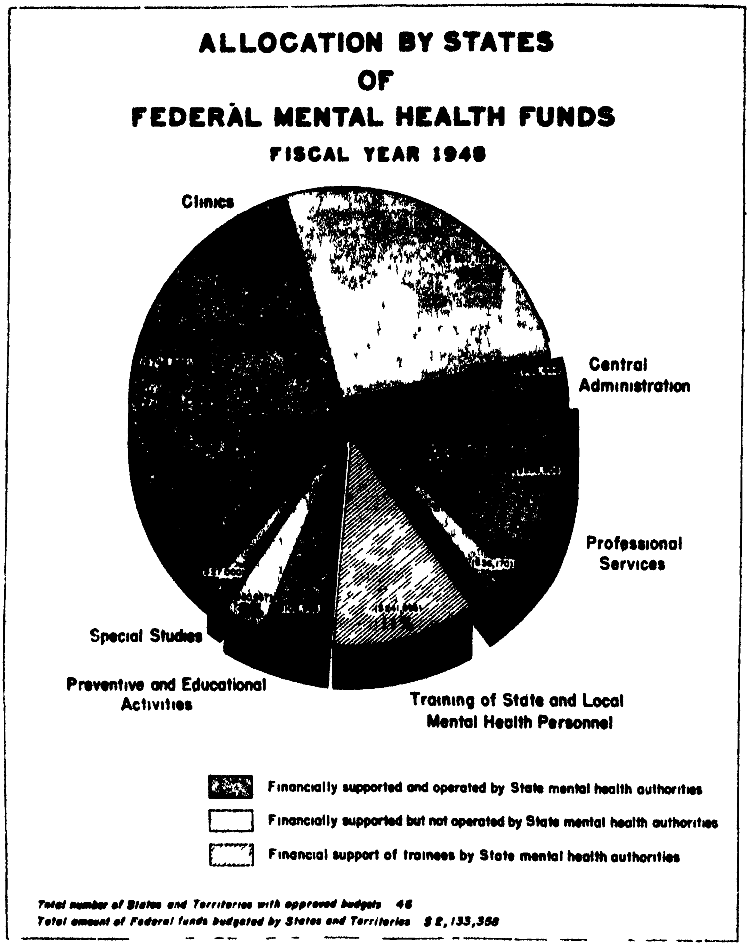

Figure 4.

Even though all of these factors were relatively unmodifiable, one is impressed by the opportunities that were not fully exploited. There are strong indications that activities of existing clinics in some States could have been increased if funds had been reallocated by the State mental health authorities to these clinics. Additional trainees could have been supported who would have had their training completed by last July or next. In some instances there was a tendency to limit the use of funds to one agency rather than bringing into the program other interested groups. More aggressive action by indi-

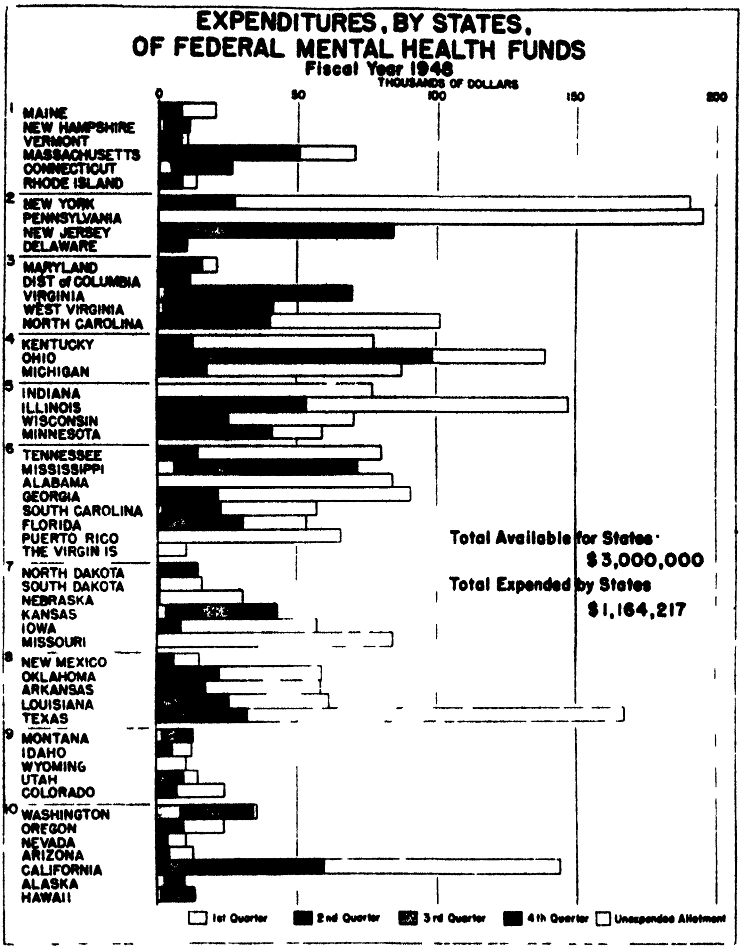

Figure 5.

viduals or groups in some States would have resulted in additional clinical services being provided for people in need of treatment. There are a number of States in which programs would be more satisfactory if an advisory board would assist the State mental health authority in the formulation of plans, and would support and help activate these plans.

Some encouraging results were obtained. Mental-health programs were initiated in the responsible agencies in 24 States. The existing programs were expanded to a small or large degree in an additional

The 108 individuals of this series were from two groups; 40 subjects were students at the University of North Carolina in Chapel Hill, and 68 were patients undergoing penicillin treatment for early syphilis at the Eastern Medical Center in Durham.[3] The large majority of this latter group were Negroes. The subjects from Chapel Hill had been resident there for at least 6 months, while the individuals at Durham were there temporarily for a 10-day course of antisyphilitic therapy. This latter group actually made their homes in about 35 communities scattered over a large part of North Carolina.

There were no significant differences in the age distribution of the various groups. About 80 percent of the individuals were young adults between 17 and 27 years of age, while practically all were between 17 and 35 years.

None of these cultures revealed the presence of pathogenic enteric organisms. The specimens from Chapel Hill were derived from individuals with various gastrointestinal complaints, while no recent history of diarrheal disease was recorded in the group from the Eastern Medical Center. It may be pointed out here that Nelson et al. (*10*) have reported the finding of large numbers of *Shigellae* in the military population in the southeastern United States during 1943 and 1944. These data suggest that high prevalences also occur in the civilian population of this area.

Results

Prevalence of Antagonists by Strain

Of a total of 2,105 strains of coliform organisms tested for their inhibitory properties, 5.4 percent were highly active and 19.4 percent slightly active. The results are summarized in table 1.

The over-all incidence of greatly active strains is quite similar to the values found for the Texas and New York groups previously reported (10.0 and 4.4 percent, respectively). However, the slightly active organisms are much more numerous than in the previous series (8.3 and 7.3 percent, respectively).

Comparison of the prevalences of both types of antibiotic producers in the Chapel Hill and Durham groups reveals significantly higher levels in the former. The probability (P) was 1:1,000 that the observed distribution is due to chance alone, using the X^2 test. The importance of this difference is not clear, however, in view of the higher antagonist carrying rate in the Durham individuals.

It is of interest that the over-all yield of slightly active strains was

---

[3] The authors are grateful to Dr. Ralph Hogan, and Dr. E Hedgepeth for arranging the transfer of the specimens tested.

Table 1. *Incidence of antagonistic coliform strains*

Group	Medium	Total number of strains tested	Coliforms	
			Slightly antagonistic	Greatly antagonistic
Chapel Hill	SS	302	65	29
	MacConkey	467	112	56
Eastern Medical Center (females)	SS	408	83	18
	MacConkey	214	9	6
Eastern Medical Center (males)	SS	389	102	5
	MacConkey	325	37	0
Totals	SS	1,099	250 (22.8%)	52 (4.7%)
	MacConkey	1,006	158 (15.7%)	62 (6.2%)
		2,105	408 (19.4%)	114 (5.4%)

much greater from SS than from MacConkey (P=<1:1,000). At the same time, no significant difference was observed in the yields of highly antagonistic strains from the two media (P=1:5). Exactly the opposite effect was observed in the New York State series.

Antibiotic Production by Sample Strains

Tests were made for the production of antibiotic substances by sample strains from different individuals of this group, using the same technique previously described. Similar results were obtained. All 19 of the highly active strains produced inhibitory crude supernates, mostly with broth dilution titers of approximately 1:500. Two of these strains yielded supernates of only slight activity. All 16 strains nonactive in the living state produced nonactive supernates, while 10 of 16 slightly antagonistic strains yielded active crudes of low potency. Tests performed with these slightly active organisms on media containing suitable pH indicators revealed that local changes in pH cannot account for the inhibition zones observed. Although it is quite possible that some other nonspecific mechanism may explain these small inhibitory effects, further search will probably reveal antibiotic production by all of these slightly active strains.

Stool Extracts

Of the 110 stool extracts assayed, only 15 produced zones of inhibition of the substrate *Shigella* growth. In no instance was the inhibited area large or clean cut. The width of the zones ranged from a trace to about 2.5 mm., the majority being only traces. Table 2 summarizes these tests. No relationship was observed between the inhibitory activity of the stool extracts and the antibiotic producing capacity of the coliform flora which made up the stool. This completely random distribution strongly suggests that the inhibitions are not due to coliform antibiotics. Moreover, several stool samples whose coliform flora consisted exclusively of potent antibiotic producing organisms yielded extracts of no inhibitory activity whatsoever.

According to the previous studies with a typical antibiotic produced by one of these organisms (*8*), a zone 1 mm. wide would represent a solution inhibitory in broth in a dilution of 1:2, while a zone 2 mm. wide would indicate a dilution titer of about 1:6. It may thus be seen that this assay technique is rather sensitive to low concentrations of these substances. No studies have yet been made on the nature of the inhibitory material present in the stool extracts.

Table 2. *Results of the assays of stool extracts in relation to the coliform flora of the samples*

Coliform antagonists in stool	Type of coliform antagonists in stool	Stool extracts	
		Noninhibitory	Inhibitory
Present	Slight	42	7
	Great	11	2
	Both types	6	1
	Total	59	10
Absent		36	5

Prevalence of Antagonist Carrying Individuals

In table 3, it may be seen that of the 108 individuals included in the study, 67 revealed the presence of antagonistic coliform organisms.

Table 3. *Prevalence of individuals carrying antagonistic coliform strains*

Group	Total number individuals	Individuals with			Percent individuals carrying active strains
		Slight antagonists	Great antagonists	Both types antagonists	
Chapel Hill	40	11	7	3	53
Eastern Medical Center					
Females	32	16	4	4	75
Males	36	20	1	1	61
Total	108	47	12	8	62

This value of 62 percent is strikingly higher than those obtained previously (25 percent for Texas, and 30 percent for New York). This may merely be a result of the larger number of strains tested from each subject, 20 in this series, as compared to 8 in the others. If it does represent a true difference, however, the older age of these individuals, as well as the geographic location may be the important factors contributing to the high rate.

The concentration of such active organisms in the flora of each individual revealed the same wide range as previously. Only 9 of the 67 subjects carrying active strains showed a homogeneous population in this respect. Eight of these nine subjects were of the Chapel Hill group.

Repeat Cultures

It was possible to examine extra stool specimens from 6 individuals at intervals of several days to several weeks. All except one revealed the same type of coliform organisms on the repeat tests. This subject possessed 100 percent highly active strains on the first occasion; 10 days later, 95 percent were highly active, and 5 percent nonantagonistic; 3 weeks after that, all the strains were nonantagonistic. It is of great interest that this individual developed a hookworm infestation (*Necator americanus*) about 10 days prior to the first stool examination. The infestation was present at the time of the first two cultural examinations, but had been cured 2 weeks prior to the last.

Discussion

The high prevalence of antibiotic producing coliform organisms in a sample of the adult population of North Carolina is very similar to analagous observations made in Texas and New York State. These findings, together with the demonstration of large numbers of such bacteria in Belgium by Gratia and Fredericq suggests their universality.

The tests made with stool extracts indicate that active antibiotic is not excreted in the feces. In spite of this, it is quite conceivable that antibiotic is produced *in vivo*, but is inactivated within the fecal matter. Studies of material obtained higher within the large bowel might shed light on this important question. If it can be demonstrated that active antibiotic is actually produced within the lumen of the large intestine, the positive significance of these organisms in enteric infections would be strongly supported.

Summary

1. A survey has been made of antibiotic producing capacities of fecal lactose fermenting bacteria from an adult population in North Carolina. Of the 2,105 coliform strains examined, 24.8 percent were active in this respect. Of the 108 individuals included in the study, 62 percent carried such active strains.

2. Tests made with aqueous stool extracts from these subjects failed to reveal evidence for antibiotic production *in vivo*. Many of these stools contained large numbers of coliform strains shown to possess the ability to produce antibiotics *in vitro*.

3. The high prevalence of such strains in three widely separated sections of the United States, together with reports of such strains from Belgium and England, suggest that they are universally distributed.

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Effect of Smallpox Vaccination on the Outcome of Pregnancy

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This report is a by-product of a study of the relation of infections and illnesses occurring during pregnancy to the incidence of abortions, stillbirths, congenital malformations, prematurity and infant deaths. All women who are less than 4 months pregnant at admission to the antepartum clinic of the Sloane Hospital for Women are included in the study, which was begun October 1, 1946. Each woman is followed through her pregnancy with a detailed history of all illnesses which occur. The infant is examined at birth for congenital abnormalities and is reexamined at the ages of 6 months and 1 year for physical and mental development and for congenital abnormalities which were not evident at birth. Autopsies are performed in practically all cases in which fetal or infant deaths occur.

Conservative standards are observed in classifying congenital malformations and no cases are so classified if there is any doubt as to the presence of an abnormality. Every infant is X-rayed (skull and chest) shortly after birth and a special ophthalmological examination is made to detect abnormalities which might be missed in the usual clinical examination. In stillborn infants and those who die after being born alive, autopsy findings form the basis for classification. Clinical signs such as the presence of unexplained cyanosis or even the presence of a persistent and loud precordial murmur are not accepted as adequate evidence of a congenital cardiac abnormality unless the diagnosis is confirmed roentgenographically. Minor anomalies, such as small hemangiomata of the skin, are not included as congenital malformations.

The occurrence of nine cases of smallpox in the spring of 1947 in New York City and the subsequent mass vaccination of an estimated 80 percent of the total population (*1*) afforded an opportunity to utilize the data collected in this study to evaluate the effect of smallpox vaccination on the outcome of pregnancy.

Published evidence on the effect of smallpox vaccination during pregnancy is meager. Welch (*2*) observed in 1877 that if the mother

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*Statistician, American Heart Association.

has smallpox the pregnancy may terminate prematurely or the infant may be stillborn or lost before the stage of viability. During the following decade Gast (*3*) and others (*4*, *5*) found no disturbance of pregnancy as a result of vaccination, but they did not consider the occurrence of congenital malformations. Lynch (*6*), 1932, stated that immunity is seldom transmitted to the fetus and that the procedure rarely disturbs the pregnancy. Since there was no positive contraindication in the literature for vaccination during pregnancy, it was decided at the Sloane antepartum clinic that the wisest policy was to protect the women against smallpox. Accordingly, vaccination was offered to all clinic patients who would accept it.

At the time of the mass smallpox vaccination in New York City in April 1947 there were 623 women being followed in the study. Of these, 512 were vaccinated and 111 were not vaccinated. An additional 270 women who were pregnant at the time of the mass vaccination were later admitted to clinic and to the study group. Of these, 208 were vaccinated at health department clinics or by private physicians and 62 were not vaccinated. Those women who were vaccinated before clinic admission were practically all less than 3 months pregnant at the time of vaccination. The women attending prenatal clinic at the time of vaccination were practically all more than 3 months pregnant when vaccination occurred. Although the two groups are quite different with respect to period of gestation at vaccination and length of observation, they are combined for purposes of computing the rates of congenital malformation, stillbirth and infant death. They are kept separate in computing the abortion rates.

Table 1 shows the result of vaccination and the period of gestation at vaccination for the entire group of 893 women. It will be noted

Table 1. *Stage of gestation at time of vaccination*

Stage of gestation at vaccination or Apr 30, 1947	Number of cases				
	Total	Not vaccinated	Vaccinated		
			No reaction	Accelerated reaction	Primary take
0-3 months	313	66	60	74	113
3-6 months	320	53	55	76	136
6 months and over	260	54	34	60	112
Total	893	173	149	210	361
	Percentage distribution				
0-3 months	35.1	38.2	40.3	35.2	31.3
3-6 months	35.8	30.6	36.9	36.2	37.7
6 months and over	29.1	31.2	22.8	28.6	31.0
Total	100.0	100.0	100.0	100.0	100.0

that the four groups, "not vaccinated", "no reaction," "accelerated reaction," and "primary take," are distributed quite similarly with respect to period of pregnancy at which mass vaccination occurred Table 2 shows the age composition of the four groups The "not vaccinated" and "primary take" groups were somewhat older than the other two The differences, both in period of pregnancy at vaccination and in age, are so small, however, that they can be ignored in comparing rates of abortion, stillbirth, congenital malformation and infant death for the four groups

Table 2. *Maternal age at time of vaccination*

Age	Number of cases				
	Total	Not vaccinated	Vaccinated		
			No reaction	Accelerated reaction	Primary take
Under 25 years	282		50	82	95
25–29 years	263	45	51	67	100
30–34 years	206	49	34	36	87
35 years and over	142	24	14	25	79
Total	893	173	149	210	361
	Percentage distribution				
Under 25 years	31.6	31.8	33.6	39.0	26.3
25–29 years	29	26.0	34.2	31.9	27.7
30–34 years	23.1	28.3	22.8	17.1	24.1
35 years and over	15.9	13.9	9.4	11.9	21.9
Total	100.0	100.0	100.0	100.0	100.0

Congenital malformation rates according to vaccination status are shown in table 3 Three percent of all pregnancies were found to result in definite congenital malformations The rates for women not vaccinated and for those who had primary reactions were about equal and somewhat lower than the rates for women who had no reaction or an accelerated reaction None of the differences observed, however, is statistically significant

Table 3 *Incidence of congenital malformations in offspring of vaccinated and unvaccinated pregnant women*

	Total pregnancies	Number congenital malformations	Percent congenital malformations
Not vaccinated	173	4	2.3
No reaction	149	7	4.7
Accelerated reaction	210	8	3.8
Primary take	361	8	2.2
Total	893	27	3.0

Table 4 shows the stillbirth rates among women who had attained the fifth month of pregnancy without an abortion. A stillbirth is defined as an infant born dead after 5 or more months of gestation. The incidence of stillbirths varied from 2.4 percent among women with primary takes to 4.3 percent among women with accelerated reactions. Although the "not vaccinated" and "primary take" groups had lower rates than the other two, the differences observed are not significant.

Table 4. [illegible]

[illegible]

dead, the fetus had to survive the period from vaccination to clinic admission in order for the women to be included in the study. There is, however, some evidence to support the conclusion that vaccination in very early pregnancy does not result in immediate abortion. The percentage of women vaccinated was approximately the same among the group attending clinic at the time of the mass vaccination (82.2 percent) and among those admitted to clinic after this period (77.0 percent). Six women were vaccinated in clinic in the second month of pregnancy and all of these women were delivered of normal infants at term.

The death rates under 1 month of age among infants born alive are shown in table 6. Although the infant death rates varied from 0.6 percent among the nonvaccinated to 1.7 percent among those with primary takes, the differences are not significant.

Table 6. *Incidence of infant deaths among live offspring of vaccinated and unvaccinated pregnant women*

	Total live births	Number of infant deaths	Percent of infant deaths
[illegible] vaccinated	165	1	0.6
[illegible]	138	2	1.4
[illegible] reaction	198	3	1.5
[illegible] take	346	6	1.7
Total	847	12	1.4

Conclusion

A total of 893 pregnant women were observed, of whom 720 were vaccinated and 173 were unvaccinated. On the basis of the evidence presented in this study, it is concluded that smallpox vaccination during pregnancy does not increase the incidence of congenital malformations, stillbirths, abortions, or of infant deaths.

ACKNOWLEDGMENT

[illegible] to express our indebtedness for his continuing assistance and advice [illegible] D. Rutstein, Professor of Preventive Medicine, Harvard University [illegible]

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[illegible] of the fetus with particular reference [illegible] & Syph. [illegible]

Table 4 shows the stillbirth rates among women who had reached the fifth month of pregnancy without an abortion. A stillbirth is defined as an infant born dead after 5 or more months of gestation. The incidence of stillbirths varied from 2.3 percent among women with primary takes to 4.3 percent among women with accelerated reactions. Although the "not vaccinated" and "primary take" groups had lower rates than the other two, the differences observed are not significant.

Table 4. *Incidence of stillbirths among vaccinated and unvaccinated pregnant women*

	Total pregnancies reaching fifth month	Number stillbirths	Percent stillbirths
Not vaccinated	169	4	2.4
No reaction	144	6	4.2
Accelerated reaction	207	9	4.3
Primary take	354	8	2.3
Total	874	27	3.1

Abortion rates among women less than 5 months pregnant at the time of vaccination are shown in table 5. An abortion is defined as a fetus delivered before the fifth month of gestation. There are two separate groups of patients in the study—those attending clinic at the time of vaccination, and those admitted to clinic after vaccination. The latter group was vaccinated earlier in pregnancy, and the average period of clinic observation during which abortion could have occurred is longer than for those vaccinated in clinic; in fact, a higher abortion rate did occur in the group observed for the longer period (4.1 percent compared with 3.1 percent), but these differences are not significant. From table 5 it is evident that vaccination results in no significant differences in abortion rates.

Table 5. *Abortion rates among women in first half of pregnancy at time of vaccination*

	Attending clinic on Apr. 30, 1947			Admitted to clinic after Apr. 30, 1947		
	Number less than 5 months pregnant at vaccination	Number abortions	Percent abortions	Number less than 5 months pregnant at vaccination	Number abortions	Percent abortions
Not vaccinated	41	2	4.9	62	2	3.2
No reaction	44	1	2.3	55	4	7.3
Accelerated reaction	62	2	3.2	67	1	1.5
Primary take	114	3	2.6	86	4	4.7
Total	261	8	3.1	270	11	4.1

Most of the women who were vaccinated in the first or second month of pregnancy were vaccinated before clinic admission and could not be observed for abortion immediately following vaccination. Indeed, the fetus had to survive the period from vaccination to clinic admission in order for the women to be included in the study. There is, however, some evidence to support the conclusion that vaccination in very early pregnancy does not result in immediate abortion. The percentage of women vaccinated was approximately the same among the group attending clinic at the time of the mass vaccination (82.2 percent) and among those admitted to clinic after this period (77.0 percent). Six women were vaccinated in clinic in the second month of pregnancy and all of these women were delivered of normal infants at term.

The death rates under 1 month of age among infants born alive are shown in table 6. Although the infant death rates varied from 0.6 percent among the nonvaccinated to 1.7 percent among those with primary takes, the differences are not significant.

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A total of 893 pregnant women were observed, of whom 720 were vaccinated and 173 were unvaccinated. On the basis of the evidence presented in this study, it is concluded that smallpox vaccination during pregnancy does not increase the incidence of congenital malformations, stillbirths, abortions, or of infant deaths.

ACKNOWLEDGMENT

We wish to express our indebtedness for his continuing assistance and advice to Dr. David D. Rutstein, Professor of Preventive Medicine, Harvard University Medical School.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDING FEBRUARY 19, 1949

A total of 19,619 cases of measles was reported for the week, as compared with 20,322 last week and a 5-year (1944–48) median of 13,932. Of the current total, 13,167 cases (67 percent) occurred in the New England, Middle Atlantic, South Atlantic, and West South Central areas. The largest increase (from 3,274 to 3,847) was recorded in the Middle Atlantic area, while decreases occurred in the West North Central, South Atlantic, South Central, and Pacific areas. Of the 13 States reporting currently more than 487 cases, none showed an increase of more than 137 except Pennsylvania (from 1,422 to 1,761). The total to date is 109,234, 5-year median 53,474.

A slight decline was recorded in the incidence of influenza. The current total is 4,792, as compared with 4,905 last week and 7,199 for the 5-year median. Reports of the 4 States previously reporting the largest numbers (no other State reporting more than 151 cases) are as follows (last week's figures in parentheses): Virginia 329 (431), South Carolina 920 (652), Arkansas 235 (294), Texas 2,330 (2,612) The total for the year to date is 32,208, as compared with 27,425 (the least corresponding figure of the past 5 years) reported in 1947, and a 5-year median of 83,183.

Of 68 cases of poliomyelitis reported for the week (last week 62, 5-year median 33), 10 each occurred in Minnesota and California, 7 in Texas, 5 each in Illinois and Washington, and 4 each in New Jersey and Kansas. The total of 703 cases reported for the first 7 weeks of the year (5-year median 288) is more than reported for any corresponding period of the past 5 years.

During the week 2 cases of smallpox were reported—1 each in Ohio and Louisiana. The total for the year to date is 8 cases, as compared with 22 for the same period last year and a 5-year median of 50.

A total of 9,819 deaths was recorded during the week in 94 large cities in the United States, as compared with 10,057 last week, 10,688 and 9,741, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 9,741. The total for the year to date is 69,828, same period last year 73,891. Infant deaths for the week totaled 609, last week 672, 3-year median 776. The cumulative figure is 4,760, same period last year 5,121.

Telegraphic case reports from State health officers for week ended Feb. 19, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1		27	443		14			18				6	
New Hampshire			2	1		2			1					
Vermont				302		14			4				8	
Massachusetts	8			1 396					360				65	
Rhode Island				393		11			12				2	
Connecticut			35	407	1	89			55				3	
MIDDLE ATLANTIC														
New York	10		[b] 2	1 482	6	365			[c] 276			3	130	8
New Jersey	4		3	604	2	82	4		174			1	52	2
Pennsylvania	19		(b)	1 761	12		1		216			2	74	1
EAST NORTH CENTRAL														
Ohio	10		1	72	3	70			358	1			41	12
Indiana	7	1	16	64	3	29	1		53		1	3	8	23
Illinois	1		13	85	3	154	5		236			4	44	2
Michigan [a]	1		5	599		84	1		366				46	1
Wisconsin			151	789		10	1		85			2	39	1
WEST NORTH CENTRAL														
Minnesota	5			72	4	3	10		117				2	
Iowa	2			22		4	1		32				5	4
Missouri	4		6	487		5			22		1	1	1	
North Dakota				71					13				4	
South Dakota	1			20			3		10			1		
Nebraska			1	12					6				15	
Kansas	6		1	125	1	17	4		32		2	3	5	
SOUTH ATLANTIC														
Delaware				12	2		1		12				4	
Maryland [a]	3		3	1 130	3	47			35			1	4	
Dist. of Col.	1			57		14			8			2	1	
Virginia	4		329	507	2	91			9		1	2	8	2
West Virginia	2		56	711	2	28			36			2	76	
North Carolina	6			414	2		1		29		3		15	
South Carolina	9		920	234	3	271	2		6		4	1	26	5
Georgia	3		16	234		23			3		3		1	11
Florida	16		26	121	1	15	2		4		1	3	12	4

See footnotes at end of table.

Telegraphic case reports from State Health officers for week ended Feb. 19, 1949—Continued

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	5	------	11	539	6	58	2	------	59	------	------	2	26	------
Tennessee	2	------	43	198	1	57	------	------	17	------	4	------	9	------
Alabama	4	------	68	364	3	87	2	------	11	------	2	------	12	8
Mississippi [a]	7	1	30	62	1	44	------	------	4	------	8	------	13	------
WEST SOUTH CENTRAL														
Arkansas	1	------	235	437	1	140	1	------	9	------	------	1	5	6
Louisiana	5	------	6	63	1	44	------	------	5	1	1	1	2	1
Oklahoma	2	------	85	244	3	65	------	------	26	------	------	2	5	4
Texas	29	1	2,330	2,684	7	606	7	------	39	------	2	8	130	30
MOUNTAIN														
Montana	------	------	7	60	1	35	------	------	21	------	------	------	3	------
Idaho	------	2	2	46	------	2	1	------	[c] 18	------	------	------	2	------
Wyoming	------	------	------	22	------	5	------	------	20	------	1	------	1	------
Colorado	1	------	36	327	2	46	------	------	24	------	------	1	8	1
New Mexico	------	------	4	179	1	23	------	------ [b]	11	------	------	------	3	------
Arizona	3	------	131	------	------	27	1	------	5	------	------	------	10	------
Utah [a]	------	------	1	91	------	6	2	------	6	------	------	------	18	------
Nevada	------	------	------	------	------	4	------	------	------	------	------	------	------	------
PACIFIC														
Washington	1	------	120	415	------	3	5	------	98	------	------	1	8	------
Oregon	2	------	19	522	1	34	------	------	17	------	------	------	16	------
California	8	------	49	709	5	16	10	------	[c] 52	------	------	1	8	------
Total	192	5	4,792	19,619	88	2,744	68	------	3,030	2	34	48	976	------
Median, 1944–48	288	9	7,199	13,932	173	------	33	1	3,615	8	17	42	2,095	------
Year to date, 7 weeks	1,310	53	32,208	109,234	608	16,477	703	8	19,007	8	236	285	7,469	------
Median, 1944–48	2,166	53	83,183	53,474	1,468	------	288	3	21,094	50	155	292	15,743	------
Seasonal low, week ends	(27th) July 10	------	(30th) July 31	(35th) Sept. 4	(37th) Sept. 18	------	(11th) Mar. 20	------	(32nd) Aug. 14	(35th) Sept. 4	------	(11th) Mar. 20	(39th) Oct. 2	------
Since seasonal, low week	6,424	------	68,478	161,627	1,452	------	28,030	------	41,705	23	------	3,404	17,502	------
Median, 1943–48	9,732	------	126,741	79,598	2,972	------	13,650	------	59,665	126	------	4,532	41,405	------

[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever, reported separately, as follows: Colorado 1; salmonella infections, not included, were reported separately as follows: New York 1.

Alaska: Measles 2; streptococcal sore throat 6.

Territory of Hawaii: Influenza 65; measles 222; lobar pneumonia 1; additional, week ended to February 12, influenza 69; measles 15; scarlet fever 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 5, 1949.—During the week ended February 5, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		31	1	228	785	35	62	74	222	1,438
Diphtheria			1	15	1			4		21
Dysentery:										
Amebic						2				2
Bacillary				2						2
German measles				94	11		3	6	10	124
Influenza		26			22	2	1		1	52
Measles		421	75	307	336	161	205	259	142	1,906
Meningitis, meningococcal		2					1			3
Mumps		17		118	194	44	45	52	150	620
Scarlet fever		9	4	149	95	3	15	6	12	293
Tuberculosis (all forms)		13	17	133	20	15	10	20	35	263
Typhoid and paratyphoid fever		6	1	8	2				1	18
Undulant fever					5					5
Venereal diseases:										
Gonorrhea	2	18	5	79	75	19	21	27	49	295
Syphilis	2	10	8	85	45	8	7	11	10	186
Other forms							1		1	2
Whooping cough		8	1	198	33	3	15	7	4	269

FINLAND

Notifiable diseases—December 1948.—During the month of December 1948, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	6	Poliomyelitis	8
Diphtheria	205	Scarlet fever	304
Dysentery, unspecified	1	Syphilis	175
Gonorrhea	890	Typhoid fever	13
Paratyphoid fever	99		

NEW ZEALAND

Poliomyelitis for the year 1948.—During the year 1948, poliomyelitis was reported in New Zealand as follows: For the first three quarters of the year, 39 weeks ended September 27, 1948, 885 cases, 36 deaths (see Public Health Reports for January 28, 1949, page 114); for the fourth quarter, 14 weeks ended January 3, 1949, 285 cases, 14 deaths; total number of cases reported for the year, 1,170, with 50 deaths.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—Cholera has been reported in Calcutta, India, as follows: Week ended January 29, 1949, 169 cases, 59 deaths; week ended February 5, 204 cases, 54 deaths.

Plague

India—Cawnpore.—During the week ended February 5, 1949, 14 cases of plague, with 4 deaths, were reported in Cawnpore, India.

Indochina (French)—Cambodia—Pnompenh.—During the week ended February 5, 1949, 4 cases of plague were reported in Pnompenh, Cambodia, French Indochina.

Madagascar.—During the period January 1–31, 1949, 23 cases of plague, with 18 deaths, were reported in Madagascar.

Smallpox

Bahrein Islands—Bahrein.—During the week ended February 5, 1949, 5 cases of smallpox were reported in the port of Bahrein in the Bahrein Islands.

India—Bombay and Ahmedabad.—Smallpox has been reported in the cities of Bombay and Ahmedabad, India, as follows: Bombay, week ended January 29, 1949, 25 cases, 5 deaths, week ended February 5, 32 cases, 7 deaths; Ahmedabad, week ended January 29, 1949, 99 cases, 52 deaths.

Indochina (French).—Smallpox has been reported in French Indochina as follows. Annam State, week ended January 29, 1949, 50 cases, 20 deaths; Luang-Prabang Province, Laos State, week ended February 5, 1949, 12 cases, 3 deaths.

Netherlands Indies—Java—Batavia.—During the period January 10–February 6, 1949, 273 cases of smallpox were reported in Batavia, Java, Netherlands Indies.

Turkey.—During the week ended February 12, 1949, 20 cases of smallpox with 7 deaths were reported in Turkey, and 18 cases were reported during the week ended February 5.

Yellow Fever

Panama—Pacora.—Of the 8 cases of yellow fever with 6 deaths reported January 17, 1949, in the region of Pacora, Panama (see Public Health Reports for February 4, 1949, p. 158), 3 additional cases have been confirmed. All of the cases are stated to have been infected in the jungle. The first case occurred November 11, 1948, and the last case was fatal December 30.

Peru—San Martin Department—Saposoa.—Delayed report: On July 11, 1948, 1 fatal case of yellow fever was reported in Saposoa, Saposoa Province, San Martin Department, Peru.

DEATHS DURING WEEK ENDED FEB. 12, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Feb. 12, 1949	Corresponding week, 1948
Data for 94 large cities of the United States		
Total deaths	10,057	
Median for 3 prior years	10,071	
Total deaths, first 6 weeks of year	60,009	63,203
Deaths under 1 year of age	672	678
Median for 3 prior years	670	
Deaths under 1 year of age, first 6 weeks of year	4,151	4,345
Data from industrial insurance companies		
Policies in force	70,621,674	66,861,796
Number of death claims	13,755	10,735
Death claims per 1,000 policies in force, annual rate	10.2	8.4
Death claims per 1,000 policies, first 6 weeks of year, annual rate	9.8	10.7

* * *

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Relationship Between Infant Mortality and Socioeconomic Factors in Urban Areas

By Marion E. Altenderfer and Beatrice Crowther

This is the second of a series of studies dealing with the relationship between mortality and socioeconomic factors in the cities and counties of the United States. The study was prepared by the Division of Public Health Methods, Public Health Service.

The reduction in infant mortality is one of the outstanding public health achievements of the twentieth century. In 1915 the number of infant deaths per 1,000 live births was 99.9 in the birth registration area (10 States and the District of Columbia). By 1933, the first year for which all the States were included in the registration area, the rate had declined to 58.1. The downward trend has continued; the rate was 47.0 for 1940 and 33.8 for 1946.

This record low infant mortality rate for the United States as a whole conceals great variations among the sections of the country and among different groups of people. In 1946, 9 States had rates of 40.0 or more for all races combined, including 1 State with a rate of 78.2. The nonwhite rate for the United States was 49.5, and in 5 States more than 100 out of every 1,000 nonwhite infants died before they reached 1 year of age. Similarly, State rates conceal variations from county to county and city to city. These variations are associated with differences of many kinds among the various localities. The first paper of this series showed that in the cities of 100,000 or more population infant mortality varied inversely with per capita income and with the percentage of white persons in the population (*1*).

The present study is an attempt to investigate the type of association between certain socioeconomic factors and infant mortality. It is based upon the smallest, most homogeneous units for which infant mortality data are available. These units are the urban places of 10,000 or more population; they will be referred to as cities, although some are called towns or townships.

Of the various measurable socioeconomic factors, four were chosen for analysis. Others were considered, but had to be discarded because the data needed were not available for the cities in this study. The factors are: racial composition, income level of the population, size of community, and utilization of medical facilities. Since the components of the nonwhite population other than Negro are negligible in most cities, the percentage of white persons is used to measure racial composition (*2*). The per capita income is used as the measure of the relative income level of the population (*3*). The actual 1940 population is used as the measure of size of community (*4*). The percentage of births to residents which were attended by a physician in the hospital is used as the measure of the availability and utilization of medical facilities (*5*).

All the socioeconomic data are for the census year 1940, since three of the four factors are related to population. The infant mortality rates are for the 2-year period 1939–40 (*6*). If data had been available, a longer period (3 or even 5 years) would have been desirable to minimize further the year-to-year fluctuations in the number of infant deaths.

Since both the percentage of births hospitalized and the infant mortality rate are based on the number of live births registered, these factors are affected by differences in the completeness of birth registration. A birth registration study made in connection with the 1940 census showed that for the urban places of 10,000 or more population registration was 97 percent complete. Correction for incompleteness of birth registration would reduce the percentages of births hospitalized and the infant mortality rates very little for the 70 percent of the cities in which 95 percent or more of the births were registered. These factors would be reduced appreciably only in the 5 percent of the cities in which less than 80 percent of the births were registered. It is felt, therefore, that correction of the data for incompleteness of birth registration would have little effect on either the direction or the magnitude of the associations noted in the present study.

The relationship between infant mortality and the four socioeconomic factors is shown in the table. The 973 cities[1] included in the study were ranked according to their infant mortality rates and divided into quartile intervals. The three lower quartile intervals each contain 243 cities and the highest interval 244. For each quartile interval the rates measuring percentage of white persons in the population, per capita income, and percentage of births hospitalized were averaged. For the size-of-community factor the median rather than the mean population was used to avoid having the results unduly weighted by the large cities.

An inverse or negative association between infant mortality and per capita income, percentage of births hospitalized, and percentage of white persons in the population is evident. That is, a low infant

---

[1] Cities for which income data were not available are excluded

Relationship between infant mortality and four socioeconomic factors, 973 cities

Quartile interval by rank of infant mortality rate	Mean				Median size of city, 1940
	Infant deaths per 1,000 live births, 1939–40	Per capita income, 1940	Percentage of births hospitalized, 1940	Percentage of white persons in population, 1940	
Total	47.4	$682	73.4	92.1	20,546
Lowest	27.8	722	86.5	97.7	21,954
Second	39.4	727	78.9	95.3	23,642
Third	49.0	686	72.4	92.2	22,474
Highest	73.2	595	55.8	83.2	16,787

mortality rate is associated with high values of these three socioeconomic factors and a high infant mortality rate with low values. The association with size of city is irregular; however, the median size of city for the highest quartile interval is considerably smaller than the other three medians.

The table also shows the relationship among the various socioeconomic factors. For example, a high percentage of births hospitalized is associated with a high per capita income and a high percentage of white persons in the population. For this reason the inverse association of some of the factors with infant mortality may be a result of direct association among the socioeconomic factors. To investigate this possibility, the relationship between infant mortality and each of the four factors must be studied with the effect of one or more of the other factors removed.

Standardized rates afford one way of eliminating individual factors.[2] The actual and standardized infant mortality rates for the 973 cities classified by each of the 4 socioeconomic factors in turn appear in the chart.[3]

The percentage of births hospitalized shows a marked inverse association with infant mortality (chart, pt. A). When the other three socioeconomic factors are held constant, this relationship is still present. The relative differences in the rates between the class intervals are approximately the same as for the actual rates, but the range decreases from 27.9 to 18.9.

Elimination of the three other factors greatly reduces the negative association between per capita income and infant mortality (pt. B). Not only is the range of the standardized rates about one-third that of the actual rates, but the highest rate is now in the $500–674 income class, rather than in the lowest class.

Standardizing the rates classified by percentage of white persons in the population (pt. C) results in little change from the actual rates and has practically no effect on the range. Although the difference in

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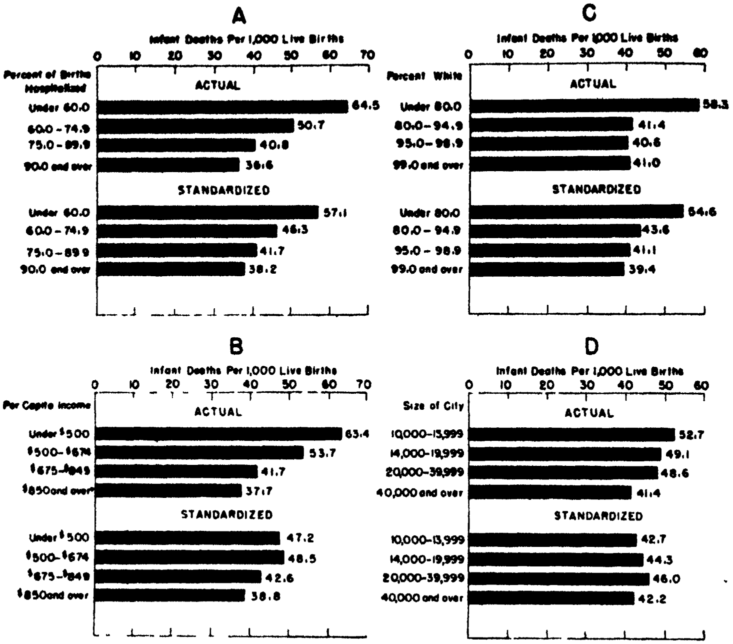
[2] This method is described in appendix I.

[3] The number of cities in each class interval for each factor appears in appendix II.



Actual and standardized infant mortality rates, 973 cities 1939–40.

the rates between the first 2 groups (those with less than 95.0 percent white population) has been reduced by standardization, it is still substantial.

Standardizing the rates by size of city (pt. D) reverses the trend in the actual rates. In other words, the slight negative association between size of city and infant mortality found in the actual rates has been replaced by an even slighter positive association.

The standardized rates thus show the association between infant mortality and each of four socioeconomic factors independent of the other three factors. The chart indicates that there is a greater inverse association with infant mortality for some of the factors than for others. Since this method of analysis does not permit a precise measure of the comparative importance of the various factors, correlation coefficients were used to evaluate each factor.

The simple or zero-order correlation coefficients between infant mortality and each of the four socioeconomic factors are:

Percentage of births hospitalized	—.57
Percentage of white persons	—.41
Per capita income	—.33
Size of city	—.057

These results are about what would be expected from an inspection of the actual rates in the chart. The correlation coefficients show that the degree of inverse association between infant mortality and percentage of births hospitalized is considerably greater than for the other three factors. The second highest order of association is with percentage of white persons in the population. The coefficient of correlation with per capita income is smaller but still large enough to have some meaning. The coefficient for size of city is not meaningful. The simple correlation coefficients measure the gross relationship between infant mortality and each of the four factors.

Partial correlation coefficients are used to measure the net relationship between infant mortality and each of the four factors with the effect of one or more of the other factors removed. Since the zero-order coefficient between infant mortality and size of city was not meaningful, neither the higher-order coefficients for this factor nor the effects of its removal on the other factors are shown here.[4]

The first-order partial correlation coefficients for infant mortality and percentage of births hospitalized are:

Effect of per capita income removed	—. 49
Effect of percentage of white persons removed	—. 47

Both are lower than the corresponding zero-order coefficient but still large enough to have meaning. Therefore the negative association between infant mortality and percentage of births hospitalized is largely independent of per capita income and of the color composition of the population.

The first-order coefficients for infant mortality and percentage of white persons in the population are:

Effect of per capita income removed	—. 35
Effect of percentage of births hospitalized removed	—. 20

The first of these coefficients is large enough to be meaningful, but the second is probably too small. In other words, the fairly high order of correlation between infant mortality and color composition (—.41) is reduced considerably when the effect of per capita income is removed and is cut almost in half when the effect of percentage of births hospitalized is removed.

The first-order correlation coefficients for infant mortality and per capita income are:

Effect of percentage of white persons removed	—. 26
Effect of percentage of births hospitalized removed	—. 055

Neither of these coefficients can be considered meaningful. The association between infant mortality and per capita income is reduced to a negligible amount by removing the effect of percentage of births hospitalized.

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[4] See appendix III for complete set of the zero and higher-order correlation coefficients between infant mortality and the four socioeconomic factors.

The only second-order correlation coefficient large enough to have meaning (−.41) is that between infant mortality and percentage of births hospitalized with the effect of per capita income and percentage of white persons removed.

Summary

The association between infant mortality and four socioeconomic factors has been studied, using data for 973 cities of 10,000 or more population. Two methods are used to measure the association between infant mortality and each of the four factors with the effect of three factors removed.

The method of standardized rates shows that there is marked inverse association between infant mortality and percentage of births hospitalized when the combined effect of per capita income, percentage of white persons in the population, and size of city is removed. The negative associations between infant mortality and percentage of white persons in the population and between infant mortality and per capita income are less marked when the effect of the other three factors is removed. The inverse association with size of city disappears completely with standardization.

The method of partial correlation coefficients shows that the relationship between infant mortality and percentage of births hospitalized is independent of racial composition, per capita income, and size of community. The correlation between infant mortality and each of the other three factors becomes negligible when the effect of hospitalization is removed. In other words, the association of low infant mortality with high per capita income and with high percentage white is a consequence of the association of high values of these factors with high percentages of births hospitalized.

The high correlation between infant mortality and percentage of births hospitalized does not necessarily indicate a causal relationship. It is not hospitalization in the narrow sense of the word but the concomitant circumstances—such as an aseptic environment, the availability of skilled care and of facilities for dealing with emergencies, and the better prenatal care usually associated with hospitalization—that save many infant lives. The components of maternity care are difficult to evaluate individually but hospitalization at delivery is an index of the utilization of the best available care.

Infant mortality is affected by many factors in addition to those used in this analysis. Therefore, some of the association noted here may be due to factors that have not been considered. Nevertheless, hospitalization at delivery, with the high quality of infant and maternal care it provides, appears to be important in preventing infant deaths in this country.

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Appendix I

Method of Deriving Standard or Adjusted Rates

This method is an adaptation of that known as "age adjustment by the direct method" used in mortality and morbidity statistics. A discussion of this method will be found in chapter IV of Vital Statistics Rates in the United States 1900–1940, by Forrest E. Linder and Robert D. Grove. The distribution of live births in the 973 cities was used as the "standard." The explanation below describes the steps taken in standardizing the rates for percentage of births hospitalized, holding per capita income, percentage white, and size of city constant (chart, part A).

1. The 973 cities were classified according to the four socioeconomic factors, using the four class intervals for each factor shown in the chart. This process resulted in 256 groups of cities. The infant mortality rates were computed for each group by dividing the total number of infant deaths by the total number of live births.

2. The 973 cities were then classified according to three factors, per capita income, percentage white, and size of city, using the same class intervals as above; 64 groups of cities were obtained. The live births were totaled for the cities in each of these groups.

3. Each of these 64 totals was multiplied in turn by the infant mortality rates for the four percentage-of-births-hospitalized groups [illegible]

(from step 1) that fell into a corresponding classification by size of city, percentage white, and per capita income.

4. The results of the multiplications were totaled for each of the four percentage-of-births-hospitalized groups. Each of the totals was divided by the total number of live births in the same percentage-of-births-hospitalized group.

The four rates obtained are the infant mortality rates in each percentage-of-births-hospitalized group, adjusted for the other three factors. A similar procedure was used to obtain the standardized rates in parts B, C, and D of the chart.

Appendix II

Class Intervals

Several considerations influenced the choice of class intervals for the classification of the 973 cities according to the four socioeconomic factors. An attempt was made to have approximately the same number of cities in each of four groups and at the same time have the intervals begin and end at natural breaking points in the scale. This goal was achieved fairly well in the classification by size of city, the four groups containing 252, 221, 250, and 250 cities. For the classification by percentage of births hospitalized the groups are less uniform in size—235, 200, 283, and 255 cities. For the other two factors this method of classification could not be used. For per capita income the numbers of cities in the two end intervals were made approximately equal and the two middle intervals were made equal in span resulting in 122, 330, 394, and 127 cities in the respective groups. The large number of cities with 99.0 or more percent white persons in the population made impossible any systematic division into class intervals for racial composition; the numbers of cities in each group are 139, 205, 275, and 354.

Appendix III

Partial Correlation Coefficients—Infant Mortality and Four Socioeconomic Factors

1—infant mortality
2—percentage of births hospitalized
3—per capita income
4—percentage of white persons in the population
5—size of city

The subscript 12.3 indicates that the correlation is between infant mortality (1) and percentage of births hospitalized (2) with per capita income (3) held constant. The other subscripts have analogous meanings.

Zero order	*First order*	*Second order*	*Third order*
	$r_{12.3} = -.49$	$r_{12.34} = -.41$	
$r_{12} = -.57$	$r_{12.4} = -.47$	$r_{12.35} = -.49$	$r_{12.345} = -.41$
	$r_{12.5} = -.57$	$r_{12.45} = -.47$	
	$r_{13.2} = -.055$	$r_{13.24} = -.050$	
$r_{13} = -.33$	$r_{13.4} = -.26$	$r_{13.25} = -.055$	$r_{13.245} = -.048$
	$r_{13.5} = -.33$	$r_{13.45} = -.25$	
	$r_{14.2} = -.20$	$r_{14.23} = -.20$	
$r_{14} = -.41$	$r_{14.3} = -.35$	$r_{14.25} = -.20$	$r_{14.235} = -.20$
	$r_{14.5} = -.41$	$r_{14.35} = -.35$	
	$r_{15.2} = -.0061$	$r_{15.23} = -.00020$	
$r_{15} = -.057$	$r_{15.3} = -.012$	$r_{15.24} = -.020$	$r_{15.234} = -.015$
	$r_{15.4} = -.071$	$r_{15.34} = -.020$	

Effect of Sodium Fluoroacetate (1080) in Poisoned Rats on Plague Diagnosis Procedures

—Preliminary Report—

By I. Gratch, M. D., P. L. Purlia, and M. L. Martin, B. A.*

A preliminary report from experimental work indicates the rodenticide sodium fluoroacetate, 1080, does not interfere with the diagnosis of plague in poisoned rats. The suspicion of some workers that the presence of the poison in the body of a rat might interfere with plague diagnosis in the animal led to the present experiments. The Division of Foreign Quarantine of the Public Health Service initiated use of 1080 as a rodenticide on surface vessels in 1945.[1]

The experimental work concerning the following two problems was begun in March 1948, and is being continued:

1. When pathological material from rats poisoned with 1080 and suspected of plague infection is inoculated into guinea pigs, is there risk of killing the guinea pigs by means of 1080 rather than by *Pasteurella pestis*, thus making the diagnostic procedure unreliable?

2. Has 1080 any bactericidal or at least bacteriostatic properties, particularly against *P. pestis?*

---

*Surgeon (R), Inspection Officer, and Medical Technician, respectively, Public Health Service Quarantine Station, New York.

[1] John H. Hughes: Studies in deratization of surface vessels by means of 1080 (sodium fluoroacetate). Pub. Health Rep. 62: 933 (1947). Reprint 2793.

Of 1,190 rats autopsied during the present investigation, 202 were brought from ships treated with 1080; the others were collected after HCN gas fumigation, trapping, or manual killing, or were found dead from causes unknown to the writers. The 202 rats were delivered to the laboratory in 20 lots of from 1 to 35 rats; each lot was taken from a different ship. Liver and spleen from one rat, or from several rats, taken at random from most of these lots, served as material for the study in an attempt to answer the first of the two questions set forth above.

The technique of these experiments was as follows: Liver and spleen from one or more rats (presumably killed by 1080), mixed with a small amount of sterile physiologic solution of NaCl, were ground in a sterile mortar and allowed to sediment. Then the supernatant fluid was injected subcutaneously into one or more guinea pigs (0.5 to 1 cc. for each guinea pig) through the shaven skin of the abdominal region previously washed with soap and water and disinfected with alcohol.

None of the guinea pigs so inoculated presented any sign of illness during a period of observation which varied from 2 to 6 months.

It was concluded then that 1080 in rats killed by means of this poison does not reach the liver and spleen in sufficient quantity to kill a guinea pig by means of the above-described method. Therefore it was considered that, for the purpose of biological confirmation of tentative diagnosis of plague infection, routine inoculations of guinea pigs are justified not only in the case of rats killed by HCN gas fumigation or by trapping, but also in the case of rats poisoned with 1080.

Concerning the above observation, it could not be absolutely stated that the rats with which the experiment was conducted had ingested 1080. Was it possible that the rats had died from some cause other than poisoning by 1080?

Since, as far as our knowledge goes, there is no specific test which could unquestionably prove or disprove that the death of these rats was caused by ingestion of 1080, it was necessary to devise some modification in the procedure of the experiments. This was done in the following way: While liver and spleen of a rat supposedly dead from 1080 poisoning were injected into one guinea pig, the stomach of the same rat was used for injection into another guinea pig. For this purpose the stomach and its contents, mixed with a small amount of sterile saline solution, were ground in a sterile mortar and allowed to settle, and the supernatant fluid (0.5 to 1 cc.) was injected subcutaneously through the shaven skin of the abdominal region previously washed with soap and water and disinfected with alcohol.

The results of this series of experiments confirmed the previously stated conclusions. While guinea pigs inoculated with liver and spleen emulsions survived without revealing any sign of illness during a long period of observation, other guinea pigs injected with stomach and stomach content emulsions were seized, in about one hour after injection, with violent convulsions lasting 10 to 15 minutes, followed by death. These reactions are characteristic of 1080 poisoning. This experiment has been repeated several times, always with the same result. For the purpose of control, one guinea pig was injected with the stomach of a trapped rat, and another guinea pig was injected with the stomach of a rat killed by HCN gas. Neither guinea pig died.

During the investigation this question presented itself: How much value would these inoculations have for the purpose of biological confirmation (in this particular case, of plague infection) if 1080, in concentration used for rat poisoning, should possess some bactericidal properties? If it possessed such properties, then even if the autopsied rat presented lesions macroscopically suggestive of plague infection it would not be possible to isolate plague bacilli from the guinea pig inoculated with viscera of the rat. This consideration introduces the second problem previously stated, namely, bactericidal or bacteriostatic properties of 1080.

Observations of growth, on ordinary media, of habitual intestinal flora from rats revealed identical results regardless of whether the rats had been killed by 1080 or by HCN gas. These observations suggested that 1080 probably had no germicidal properties. To verify this impression an experiment was set up by implanting strains of various organisms on ordinary media, and contemporarily on identical media to which had been added 1080 in the concentration used in poisoning rats. The growth both on ordinary media and on media to which 1080 was added was identical; no bacteriostatic property of 1080 was noted.

The experiment was varied by the addition of compound 1080 and substances of known germicidal action to suspensions of the same organisms in sterile physiologic saline solution. After varying periods of contact of these organisms with the substances, the suspensions were implanted on blood agar. After 24 hours' incubation the plates were observed for growth, and revealed no bacteriostatic effect from presence of 1080. Plates implanted with organisms exposed to the known germicidal agents showed no growth.

Analagous experiments were conducted to test for any bacteriostatic properties of 1080 against *P. pestis*. For this purpose a nonpathogenic strain (A 1122) of *P. pestis* was used. The results were: absence, at least *in vitro*, of any bacteriostatic property in 1080 against *P. pestis*.

A final experiment *in vivo*, aimed to corroborate our assertion that 1080 in concentration used for rat poisoning has no bacteriostatic property against *P. pestis*, was conducted in the following way: One guinea pig was inoculated, subcutaneously, with 0.5 cc. of 24-hour broth culture of a virulent strain (Shasta) of *P. pestis* on October 26, 1948. Two days later when the guinea pig showed signs of illness, which we suspected to be plague infection, 1080 in water solution (18 grams per gallon) was administered orally to the animal by pipette. In about 35 minutes the guinea pig was seized with violent convulsions (characteristic of 1080 poisoning) and died. Autopsy, performed immediately after death, revealed plague infection. The liver and spleen and the bubo present in the left inguinal region were ground in a mortar containing a small amount of sterile saline solution. The emulsion obtained was left to settle, and 0.5 cc. of the supernatant fluid was injected subcutaneously into another guinea pig. This second guinea pig died from plague 4 days later, presenting on autopsy typical signs of the disease, including buboes in inguinal and axillary regions, hemorrhagic spots in subcutaneous tissue and on abdominal and thoracic viscera, and congested liver and spleen. Smears taken from liver and spleen showed microscopically small gram negative bacilli, morphologically similar to *P. pestis*. Cultures were made from the blood, heart, liver, lung, spleen, and buboes, all of which gave growth to organisms, later identified as *P. pestis*.

Summary and Conclusions

1. Experiments showed that sodium fluoroacetate (1080) in rats killed by this poison does not reach the liver and spleen in a sufficient amount to contraindicate routine injections from the rats into guinea pigs for biological confirmation of a tentative diagnosis of plague.

2. Sodium fluoroacetate, in concentration used for rat poisoning, has no bacteriostatic properties against *Pasteurella pestis*.

ACKNOWLEDGMENT

The authors express appreciation to Dr. John F. Mahoney, Director, and Dr. M. A. Bucca, Bacteriologist, of the U. S. Public Health Service VD Research Laboratory in Stapleton, N. Y., for their valuable technical advice and for having obtained the two strains of *Pasteurella pestis* (from Dr. Karl F. Meyer of the George Williams Hooper Foundation for Medical Research, University of California); and to Medical Director Calvin B. Spencer, Medical Officer in Charge, U. S. Quarantine Station, New York, for his guidance and constructive criticism.

"Infection Unit" and "Index of Aggregation"

Suggested Epidemiological Terms

By Filip C. Forsbeck, M. D.[*]

It is useful to divide typhoid cases into endemic and epidemic groups in order to study their relative rate of decline. Or, the typhoid phorologist may wish to compare accomplishment in tracing sources of endemic and epidemic cases. To find the source carrier of a 50-case outbreak is a perfect epidemiological record, but to find only 1 source carrier in the investigation of 50 endemic cases is ordinarily considered poor work. Yet in each instance the carrier discovery rate is 2.0 per 100 cases.

An added difficulty arises from the fact that it is not always obvious as to whether a given group of cases constitutes an outbreak. The Michigan criterion for classification as an outbreak is reasonable evidence of an indirect mode of transmission, irrespective of the number of cases.

> Prior to January 1, 1936, the Michigan Department of Health arbitrarily chose three cases as the minimal for classification as an outbreak. Emphasis was thus placed on the fact that ordinarily the more cases involved, the greater the significance of an epidemiologic diagnosis of an outbreak. G. W. Anderson (*1*) has cited illustrations of single cases almost certainly traced to a mode of infection such as milk, and this situation has also occurred in Michigan. He insists that there is thus no essential difference in one case or many cases insofar as mode of infection is concerned. The writer agrees with Dr. Anderson's concept: namely, that an outbreak should refer to one or more cases with probably a common mode of infection. This of course would mean that a large percentage of typhoid cases now classified as endemic would be classified as outbreaks if it could be determined that infection had taken place otherwise than by direct contact. There is indirect evidence that many single cases are thus caused, and in the case of endemic typhoid fever the classification, "direct contact" is almost always untenable. It is believed that the great bulk of endemic cases should be classified as "mode unknown."

The establishment of such criterion does not eliminate all conjecture, however. Assume, for example, that a typhoid carrier visits a family on August 1 only. Every member then contracts typhoid fever with onset dates on August 5, 9, 10, 12, and 14. It is true that all 5 cases

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From the Michigan Department of Health and the Public Health Service.

[*] Dr. Forsbeck, at the time of his death in 1940, was a Surgeon in the Public Health Service; he had previously served as Director of the Bureau of Epidemiology of the Michigan Department of Health. After his death, Mrs. Forsbeck entrusted his papers to Dr. Gaylord W. Anderson at the University of Minnesota in the hope that among them might be material suitable for publication. This article, based on Dr. Forsbeck's Michigan studies and bearing the stamp of approval of the Michigan Department, was among these papers. It is published here exactly as Dr. Forsbeck left it, except for minor editorial changes and a redrawing of the graph which had been left merely as a rough sketch.

may have been primary, perhaps infected by food prepared by the carrier. However, assuming a minimum incubation period of 4 days, a maximum period not less than 2 weeks, and no chance of infection from outside the family, transmission of the causative organism may have occurred in 31 other combinations.

It is suggested that such difficulties may be obviated by treating single cases, and groups of two or more however related cases, as an "infection unit." Each of the following would be an example of an infection unit:

1. Any single isolated case.
2. A family group of cases, irrespective of how infection took place (unless by chance some of the cases had an entirely separate outside source).
3. Two apparently unassociated cases 10 miles apart at the same time on an island where typhoid has not occurred for 20 years.
4. An outbreak, including secondary and succeeding cases, and the causative case, if any.

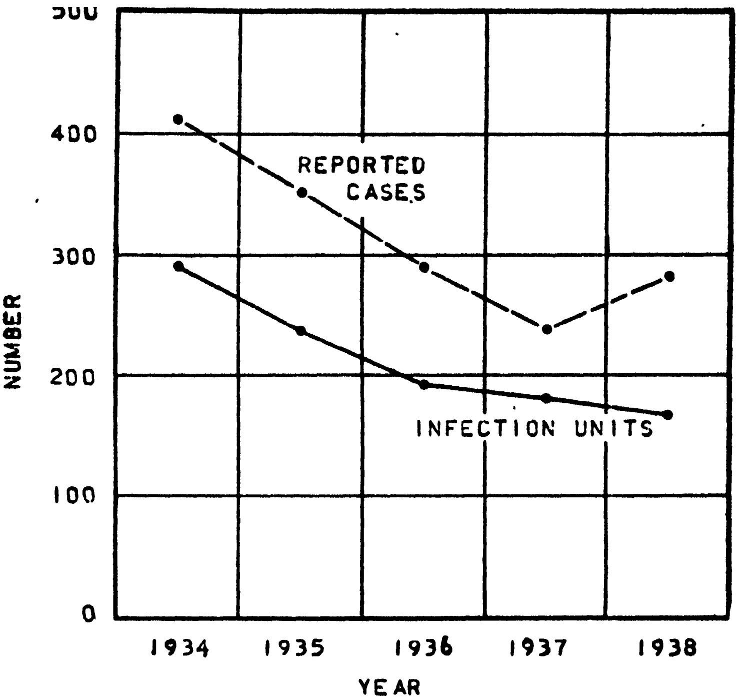
Unfortunately, we have been able to compute typhoid fever infection units in Michigan for only the years 1934–38. As may be noted in table 1, about 5 of every 6 infection units consist of single cases. The chart shows the sharp rise in case incidence from the trend line in 1938 while the infection unit incidence continues down in that year at about the same rate as in previous years.

Table 1. *Size of 1,063 typhoid infection units based on 1,571 typhoid cases reported in Michigan, 1934–38*

		Size of infection unit									
		1	2	3	4	5	6	7	8	9	10
Infection units	Number	888	94	29	19	8	4	5	4	2	3
	Percent distribution	83.4	8.8	2.7	1.8	0.8	0.4	0.5	0.4	0.2	0.3
	Cumulative percent.	83.4	92.2	94.9	96.7	97.5	97.9	98.4	98.8	99.0	99.3
Cases	Number	888	188	87	76	40	24	35	32	18	30
	Percent distribution.	56.5	12.0	5.6	4.8	2.6	1.5	2.2	2.0	1.2	1.9
	Cumulative percent.	56.5	68.5	74.1	78.9	81.5	83.0	85.2	87.2	88.4	90.3

		Size of infection unit									
		11	12	13	14	15	16	17	23	49	Total
Infection units	Number	0	0	0	1	0	1	3	1	1	1,063
	Percent distribution.	0.0	0.0	0.0	0.1	0.0	0.1	0.3	0.1	0.1	100
	Cumulative percent.	99.3	99.3	99.3	99.4	99.4	99.5	99.8	99.9	100.0	......
Cases	Number	0	0	0	14	0	16	51	23	49	1,571
	Percent distribution.	0.0	0.0	0.0	0.9	0.0	1.0	3.2	1.5	3.1	100
	Cumulative percent.	90.3	90.3	90.3	91.2	91.2	92.2	95.4	96.9	100.0	......

Typhoid in Michigan, 1934–38, showing relative stability of infection unit trend compared with case incidence trend



	1934	*1935*	*1936*	*1937*	*1938*
Reported cases	411	351	288	239	282
Infection units	289	235	192	181	166
Aggregation index	1.42	1.49	1.50	1.32	1.44

The use of infection units in connection with carrier discovery rates is another illustration. It has been customary to measure this rate of accomplishment as total carriers, discovered by whatever means, per 100 reported cases.[1] By measuring the rate in terms of carriers discovered per 100 infection units, the misleading influence of a large outbreak is obviated.

For a number of years the rate at which carriers are discovered has been compared for Detroit, other full-time cities, county health units and part-time territory. These rates are compared with similar rates based on infection units in table 2. Although Detroit had the best record based on comparison of carriers discovered per 100 cases, the full-time counties had the best record when measured by carriers discovered per 100 infection units. This shift is due to Detroit's remarkable freedom from outbreaks. Except for an outbreak of 60 cases in which infection was traced to another State and which is not included in the data, Detroit had but one outbreak in the period studied. For the period 1934–38, Detroit had but 1.16 cases per infection unit, other cities 1.49, counties 1.60, and part-time territory 1.54. The average number of cases per infection unit for Michigan, exclusive of Detroit, was 1.55 and for the entire State 1.48. It is suggested that this ratio of cases to infection units be termed the "index of aggregation".

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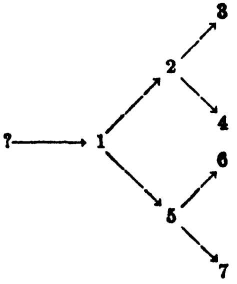
[1] In theory, a more logical measure would be the number of carriers found in connection with the investigation of cases, per 100 cases. In practice we have found that comparisons are not greatly affected by this procedure.

Infection units and the index of aggregation may be of value as a unit of measure in the epidemiology and administrative practice of other diseases.

Table 2. *Typhoid cases reported, infection units, carriers discovered, and derived data by type of health jurisdiction, Michigan, 1934–1937*

Type of health jurisdiction	Cases reported	Infection units	Carriers discovered	Carrier discovery rate per 100 cases	Carrier discovery rate per 100 I. U.	Percentage deviation from mean	
						C.D.R. per 100 cases	C.D.R. per 100 I. U.
Detroit	189	161	33	17.4	20.5	36.0+	11.4+
All other full-time cities	214	148	15	7.0	10.1	45.3−	45.1−
County health units	322	204	53	16.4	25.9	28.0+	40.8+
Part-time territory	504	384	64	11.3	16.7	11.7−	9.2−
Michigan	1,289	897	165	12.8	18.4	--------	--------

Let us assume, for example, a series of seven cases of diagnosable tuberculosis in a small community and that infection actually took place as follows:



If investigation of the primary case had led to the discovery of all associated cases we would have 1 infection unit with 7 cases, and the index of aggregation would be 7.0. If, however, all associated cases had been discovered, but cases 3 and 4 independently of each other and other cases, we would have 7 cases, 3 units, and an index of aggregation of 2.3. Again, possibly only cases 1, 2, and 5 would be discovered and associated. The index of aggregation would then be 3.0. Indices of aggregation[2] for all possibilities are as follows:

Cases	Infection units						
	1	2	3	4	5	6	7
1	1.0	------	------	------	------	------	------
2	2.0	1.0	------	------	------	------	------
3	3.0	1.5	1.0	------	------	------	------
4	4.0	2.0	1.3	1.0	------	------	------
5	5.0	2.5	1.7	1.2	1.0	------	------
6	6.0	3.0	2.0	1.5	1.2	1.0	------
7	7.0	3.5	2.3	1.7	1.4	1.2	1.0

The index of aggregation might be a better measure of tuberculosis case finding than the ratio of new cases to deaths. Only experience would determine what constituted a satisfactory index. Certainly an aggregation index of 1.0 in a large city would indicate poor work in case finding.

Infection units and the index of aggregation may be useful in the study of outbreaks. In two outbreaks of dysentery for example, an index of aggregation of 1.1 would point less to contact infection than an index of 2.1. Frost (*2*) pointed out the importance of the secondary attack rate in relationship to the general attack rate. The infection unit of course includes the primary case in the household, but the size of the unit would be closely correlated with the secondary attack rate.

The number of infection units is readily determined by assigning an infection unit number to the first or index case of each single or associated group of cases.

Summary

The term "infection unit" is submitted as a useful epidemiological term to define any isolated case and any group of two or more associated cases, regardless of the manner in which they are associated.

The term "index of aggregation" is submitted as a useful epidemiological term to define the relationship of the number of cases to the number of infection units.

REFERENCES

(*1*) Anderson, Gaylord W.: Personal communications.

(*2*) Frost, W. H.: The familial aggregation of infectious diseases. Am. J. Pub. Health 28: 7 (1938).

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[2] In the example cited there is really only one index of aggregation, 7.0. Any other figure arrived at is an observed index of aggregation, not the true one.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED FEBRUARY 26, 1949

Of the total of 24,133 cases of measles reported for the week (last week 19,755, 5-year median 15,725), 16,522 cases (68 percent) occurred in the New England, Middle Atlantic, South Atlantic, and West South Central areas. Except in the New England area, increases, slight for the most part, were reported in all geographic divisions. The largest increases occurred in the Middle Atlantic (from 3,847 last week to 4,910), South Atlantic (2,950 to 4,139), and the West South Central (3,428 to 4,598). States reporting currently more than 728 cases are as follows (last week's figures in parentheses): Massachusetts 1,224 (1,396), New York 1,620 (1,482), Pennsylvania 2,562 (1,761), Wisconsin 818 (789), Kansas 902 (625), Maryland 1,361 (1,130), Virginia 1,388 (507), Texas 3,681 (2,684), California 1,100 (709). The total for the year to date is 133,503, same period last year 92,173, 5-year (1944–48) median 69,199.

A slight decline was recorded in the reported incidence of influenza, accounted for chiefly in the reports of South Carolina, 493 cases (last week 920), and Texas, 2,172 (last week 2,330). No other State reported more than 203 cases except Virginia, 470 (last week 329), and Arkansas, 292 (last week 235).

Of 57 cases of poliomyelitis, only 4 States reported more than 2 cases—California 14, Michigan and Texas 5 each, and Minnesota 3.

Two cases of anthrax were reported, in New York, and 2 cases of Rocky Mountain spotted fever, in Iowa.

For the year to date 10 cases of Rocky Mountain spotted fever have been reported (5-year median 4), and 257 cases of tularemia (5-year median 175).

Deaths recorded during the week in 94 large cities in the United States totaled 9,419 (last week 9,819), 9,811 and 10,200, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 10,200. The total for the year to date is 79,247, corresponding period last year 83,702. Infant deaths during the week totaled 649, last week 609, 3-year median 626. The cumulative figure is 5,408, last year 5,725.

Telegraphic case reports from State health officers for week ended February 26, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	----	1	495	----	25	----	----	35	----	----	----	4	----
New Hampshire	----	----	2	8	----	4	----	----	4	----	----	----	4	----
Vermont	----	----	----	546	----	----	----	----	9	----	----	1	5	----
Massachusetts	9	----	----	1,224	1	----	----	----	300	----	----	----	52	----
Rhode Island	----	----	----	313	1	4	----	----	10	----	----	----	3	----
Connecticut	1	----	11	289	----	63	1	----	49	----	----	----	6	----
MIDDLE ATLANTIC														
New York	4	1	[b] 2	1,620	8	302	2	----	[a] 243	----	----	2	119	7
New Jersey	2	----	5	728	2	106	----	----	174	----	----	1	42	1
Pennsylvania	4	1	(b)	2,562	13	----	1	----	278	----	----	3	88	1
EAST NORTH CENTRAL														
Ohio	9	----	2	144	----	57	2	----	390	----	----	----	65	10
Indiana	8	----	4	130	2	60	2	----	188	----	1	----	48	17
Illinois	4	----	19	84	6	114	1	----	224	----	----	1	78	1
Michigan [a]	3	----	1	462	4	50	5	----	318	----	----	----	42	----
Wisconsin	----	----	73	818	4	10	1	----	87	----	----	----	30	----
WEST NORTH CENTRAL														
Minnesota	8	----	----	89	1	4	3	----	63	----	----	----	1	----
Iowa	----	----	----	30	----	4	1	2	38	----	----	----	4	12
Missouri	2	----	11	477	7	58	1	----	34	----	----	1	5	----
North Dakota	----	----	3	56	1	----	----	----	17	----	----	----	3	----
South Dakota	----	----	----	10	----	2	----	----	3	----	----	----	3	----
Nebraska	----	----	14	62	----	4	----	----	24	----	----	----	3	----
Kansas	1	----	15	902	----	9	2	----	56	----	1	----	2	1
SOUTH ATLANTIC														
Delaware	1	----	----	18	1	----	----	----	8	----	----	----	1	----
Maryland [a]	----	----	4	1,361	----	52	----	----	[a] 34	----	----	1	10	----
District of Columbia	1	----	----	76	----	20	----	----	4	----	----	----	2	----
Virginia	11	----	470	1,388	1	259	1	----	36	----	----	1	82	2
West Virginia	3	----	186	157	----	16	1	----	23	----	----	----	5	----
North Carolina	3	----	----	557	2	----	2	----	18	----	2	11	13	----
South Carolina	5	1	493	85	----	212	1	----	1	----	1	1	19	----
Georgia	4	----	16	378	3	90	2	----	13	----	3	4	7	2
Florida	8	----	6	119	1	13	1	----	6	----	----	1	2	8

See footnotes at end of table

Telegraphic case reports from State health officers for week ended February 26, 1949—Continued

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
EAST SOUTH CENTRAL														
Kentucky	5		70	433	2	43	2		67			1	22	19
Tennessee	7		110	433	2	118			57		1	2	21	
Alabama	10		142	480	7	89			22		1		11	10
Mississippi [a]	1	1	18	83	1	22			2		3	2	9	
WEST SOUTH CENTRAL														
Arkansas	6		292	709	5	90			1		1	2	10	1
Louisiana	7		4	9	2	28	2		8		4	3	2	
Oklahoma	8		63	206	3	71			15		2	1	2	6
Texas	20		2,172	3,681	6	602	5		26			2	128	31
MOUNTAIN														
Montana	2	1	22	82					24		1			
Idaho			11	48		20	1		[c] 20				4	
Wyoming	3			24		11			8					
Colorado	1		11	312		59			19			2	3	1
New Mexico	6		2	303		32			20			1	2	
Arizona	3		203	162		53			16				17	1
Utah [a]			5	87		2	2		7				27	
Nevada	1													
PACIFIC														
Washington	1		10	347		19			40			1	1	
Oregon	2		18	464	1	56	1		23				13	
California	6	1	51	1,100	14	43	14		[c] 122			3	58	9
Total	181	6	4,542	24,133	101	2,905	57	2	3,138		21	38	967	
Median, 1944-48	261	8	6,425	15,725	175		26	1	3,288	8	20	41	2,261	
Years to date 8 weeks	1,491	59	36,750	133,503	708	19,368	760	10	22,146	8	257	323	8,436	
Median, 1944-48	2,443	61	92,191	69,199	1,643		314	4	24,382	58	175	333	17,994	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week ends	6,605		73,020	185,896	1,552		28,087		44,843	23		3,442	18,469	
Median, 1943-48	10,009		135,749	95,323	3,147		13,690		62,953	134		4,571	43,221	

[a] Period ended earlier than Saturday. [b] New York City and Philadelphia only, respectively. [c] Including cases reported as streptococcal infections and septic sore throat.

[d] Including paratyphoid fever, currently reported separately, as follows: Vermont 1; Georgia 1; Colorado 1; California 1; salmonella infections, not included, were reported as follows: New York 2.

Anthrax: New York 2.

Deduction: Week ended Feb. 12, North Carolina, meningococcus meningitis, 1 case.

Additional: Week ended Feb. 19, measles, Arizona, 136 cases.

Alaska: Influenza 130; measles 4; pneumonia 4; streptococcal sore throat 6.

Territory of Hawaii: Diphtheria 1; influenza 655; measles 170; poliomyelitis 1; total of 602 delayed influenza reports for January and February included.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—December 1948.—During the month of December 1948, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence[1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	10		3		3				16	
Diphtheria	3								3	
Dysentery:										
Amebic	1	1	1				6	1	8	2
Bacillary	1		1		2		1		5	
German measles			1		1				2	
Hepatitis, infectious							1		1	
Malaria[2]	3		1		9		164		177	
Measles	2						1		3	
Meningitis, meningococcal	3	2	3			1	1		7	3
Mumps			1		2				3	
Pneumonia		9		3	16	3		8	[3] 16	23
Poliomyelitis			1		[4] 4	1	1		[4] 6	1
Tuberculosis		11		6	5			9	[3] 5	26
Typhoid fever							2	1	2	1
Typhus fever (murine)							1		1	
Yaws	1						3		4	
Yellow fever								5		5

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 6 recurrent cases.
[3] Reported in the Canal Zone only.
[4] Includes 3 cases in which the infection was contracted in Philadelphia.

Puerto Rico

Notifiable diseases—4 weeks ended February 26, 1949.—During the 4 weeks ended February 26, 1949, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	58	Syphilis	148
Diphtheria	45	Tetanus	9
Dysentery	2	Tetanus, infantile	1
Gonorrhea	177	Tuberculosis (all forms)	569
Influenza	144	Typhoid fever	12
Malaria	73	Typhus fever (murine)	2
Measles	80	Whooping cough	252
Poliomyelitis	1		

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 12, 1949.—During the week ended February 12, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		19	21	255	939	39	73	78	332	1,756
Diphtheria		1	1	17	1	1		2		23
Dysentery, bacillary				1						1
German measles				113	27			5	6	151
Influenza		29			39		2		2	
Measles		449	94	393	426	155	181	259	100	2,[illegible]
Meningitis, meningococcal					1				2	3
Mumps		28	4	118	470	42	54	19	66	801
Poliomyelitis				1						1
Scarlet fever		10	3	182	94	2	3	2	7	303
Tuberculosis (all forms)		3	7	80	16	6	16	20	38	186
Typhoid and paratyphoid fever				14	2		1			17
Undulant fever					1	1				2
Venereal diseases:										
Gonorrhea		3	12	87	53	26	10	30		221
Syphilis		3	5	77	36	12	8	7		148
Whooping cough		17		207	30	1	12	5		272

JAPAN

Notifiable diseases—5 weeks ended January 29, 1949.—During the 5 weeks ended January 29, 1949, certain notifiable diseases were reported in Japan as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Diphtheria	1,882	232	Pneumonia	14,159	
Dysentery, unspecified	162	56	Scarlet fever	518	10
Gonorrhea	15,234		Smallpox	1	
Influenza	177		Syphilis	15,830	
Malaria	114	3	Tuberculosis	30,294	
Measles	6,199		Typhoid fever	528	49
Meningitis, epidemic	109	26	Typhus fever	32	
Paratyphoid fever	214	4	Whooping cough	5,453	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

POLIOMYELITIS

Ceylon.—Reports of poliomyelitis in Ceylon are as follows: Week ended November 27, 1948, 9 cases; period November 28–December 25, 1948, 21 cases.

Mauritius.—Poliomyelitis has been reported in the Colony of Mauritius as follows: Week ended January 15, 1949, 80 cases, 3 deaths; week ended January 22, 51 cases, 2 deaths.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—For the week ended February 12, 1949, 137 cases of cholera, with 56 deaths were reported in Calcutta, India, and during the week ended February 19, 106 cases, 48 deaths were reported.

India (French)—Pondicherry.—During the period January 30–February 12, 1949, 51 cases of cholera were reported in Pondicherry, French India.

Plague

India—Cawnpore.—During the week ended February 5, 1949, 14 cases of plague, with 4 deaths, were reported in Cawnpore, India.

Siam.—For the week ended February 5, 1949, 22 cases of plague, with 8 deaths, were reported in Siam.

Union of South Africa.—During the week ended February 5, 1949, 3 fatal suspected cases of plague were reported in the Union of South Africa, 2 cases at Uitenhage, about 20 miles from Port Elizabeth, and 1 case at Queensland, inland about 200 miles from Port Elizabeth.

Smallpox

Colombia.—For the period January 1–31, 1949, 227 cases of smallpox were reported in Colombia, including 15 cases in Bogota, 12 cases in Cali, and 11 cases in Medellin.

China—Amoy.—During the period January 21–31, 1949, 30 cases of smallpox were reported in Amoy, China, and during the period February 1–10, 32 cases were reported.

Ecuador.—For the period January 1–31, 1949, 215 cases of smallpox (including alastrim), with 17 deaths, were reported in Ecuador, of which 18 cases (alastrim) were stated to have occurred in Guayaquil and 14 in Quito.

India—Ahmedabad.—During the week ended February 5, 1949, 146 cases of smallpox, with 98 deaths, were reported in Ahmedabad, India.

Netherlands Indies—Sumatra—Palembang.—For the period January 23–February 19, 1949, 25 cases of smallpox were reported in Palembang, Sumatra, in the Netherlands Indies.

Typhus Fever

Brazil—Porto Alegre.—Correction: Reports of cases of typhus fever in Porto Alegre, Brazil, published in PUBLIC HEALTH REPORTS, November 12, 1948, p. 1,504, and January 14, 1949, p. 68, were in error. Later information states that these cases were typhoid fever.

Colombia.—During the period January 1–31, 1949, 256 cases of typhus fever were reported in Colombia, including 34 cases in Medellin.

Germany—Correction: The reports of murine typhus fever in the Bremen area (Land Bremen) in the United States Zone of Germany (see PUBLIC HEALTH REPORTS, January 7, 1949, p. 38, January 21, 1949, p. 92, and February 11, 1949, p. 200) were in error. Information dated February 16, 1949, states that these cases were typhoid fever.

Palestine.—Information from Jerusalem dated February 21, 1949, states that an outbreak of typhus fever is occurring in Palestine in the Hebron and Bethlehem districts, where about 100 cases had been reported since the middle of January.

Yellow Fever

No reports of yellow fever were received during the current week.

DEATHS DURING WEEK ENDED ABOUT FEB. 19, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Feb. 19, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,819	10,688
Median for 3 prior years	9,741	
Total deaths, first 7 weeks of year	69,828	73,891
Deaths under 1 year of age	609	776
Median for 3 prior years	776	
Deaths under 1 year of age, first 7 weeks of year	4,760	5,121
Data from industrial insurance companies:		
Policies in force	70,616,279	66,865,709
Number of death claims	13,167	14,490
Death claims per 1,000 policies in force, annual rate	9.7	11.3
Death claims per 1,000 policies, first 7 weeks of year, annual rate	9.8	10.8

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PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
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ACCIDENT PREVENTION

Introduction

By Donald B. Armstrong, M. D.[*]

Accidents in the United States each year cause approximately. 100,000 deaths and result in the permanent or temporary disablement of about 10,000,000 persons. Numerically accidents represent the fourth most important cause of death. However, from the point of view of economic drain on the country and loss of productivity for which they are responsible, accidents can actually be considered as the *most* important cause of death since they generally claim their victims at a younger age than do the major chronic diseases—cancer, heart disease, and cerebrovascular diseases.

In the past, accidental deaths and injuries were accepted as more or less inevitable and their prevention considered to be outside the realm of science. A recent gradual change in this concept has been marked by some research, study, and action (chiefly in the fields of industrial and traffic safety) to correct environmental conditions and, through organized effort, to encourage or enforce individuals to follow safe practices. The success of some traffic safety programs in reducing child traffic fatalities exemplifies this type of effort. To a minor extent, this approach has been applied in the field of home safety. Up to the present time, however, insufficient research has been undertaken to determine the basic or underlying reasons as to why accidents occur; in other words, to measure the effect of individual physical, mental, psychological, and psychiatric factors upon accident causation. Obviously in the absence of such basic knowledge it has been impossible to prescribe an effective or lasting remedy.

Today, in view of the changing concept of public health, accident prevention is logically becoming a job for public health agencies, particularly with respect to epidemiological research and the determination of remedial measures. This does not mean that the pioneering efforts of many other sincerely interested groups should be discontinued or their progress in their respective fields of effort minimized.

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These groups will still have an important contribution to make. It does mean, however, that official public health agencies, local, State, and Federal, must accept a broader responsibility for finding the answer to the problem of accident prevention.

Health departments contain all the elements—the epidemiological experience, the statistical knowledge, the engineering talent, the home and other contacts through the nursing services, and the educational facilities—needed to develop an accident prevention program that, with more information as to etiology, should substantially reduce the number of accidental deaths and permanent disabilities. Compared with the mortality and morbidity caused by most of the more dramatized diseases, home accidents alone present a problem of major importance. Home accidents cause well over 30,000 deaths each year and result in the injury of about 5 million people. These figures indicate that an area of profound significance for the Nation's health and well-being has been virtually ignored by public health agencies.

Evidence that home accidents have tangible and probably definitive causes lies in that fact that the number and type of accidents in any community can be predicted with reasonable accuracy once the statistical accident record in that community for several consecutive years is known. In other words, given the present conditions of ineptness and inexperience, any community can be virtually assured that approximately the same number and kind of accidents that occurred the previous year will happen again the following year. Obviously no public health agency could or would accept this kind of static and, indeed, retrogressive condition for any of the currently troublesome diseases. Even if the health department knew of no method of preventing a constantly recurring disease, much effort would be spent in finding out its epidemiological pattern and in conducting research to uncover its cause and cure. This is what must be done in the field of accident prevention. Until we know how to prevent accidents, we need to intensify our epidemiological investigations and undertake more research and demonstrations to determine practical remedial measures and effective methods for their application.

There is no simple solution to the accident problem, nor can a control program be centered exclusively on any of the various elements involved, such as education, engineering science, and technological progress, or physical status and fitness. Education is certainly important; but educational efforts must be aimed at motivation and as yet we are not quite sure how either children or adults should be motivated to prevent accidents. Engineering science cannot provide the whole answer because many people who are exposed to the same potential accident situations will not suffer any mishap, whereas the "accident-prone" individual will. We should know why. Again, many feeble and infirm people successfully avoid injury and death from accidents year after year, while more physically robust and healthy individuals suffer repeatedly from accidents. These simple facts alone lead to the belief that there are more deep-seated causes of accidents then senility, poor health, and faulty or unsafe environmental conditions. Probably profound emotional and psychological factors are involved. The fact that in the average experience, a large percentage of accidents occur to a surprisingly small percentage of people should arouse the curiosity of any health officer. Complex, many-sided, and challenging are the factors which must be taken into account in the field of accident prevention.

Health departments, which employ qualified personnel for this purpose and are supported by adequate appropriations, working in cooperation with established safety organizations in the home, traffic, school, and industrial fields, are ideally suited to discover the answers to these puzzling questions. Until the answers are found we can predict that each year a continuing heavy volume of deaths and hospital admissions will result from accidents which can and should be prevented.

The Accident-prone Individual

By Franz Alexander, M. D.*

The tremendous practical importance of accidents in relation to our national economy is well known. Medical men, psychiatrists, psychologists, and statisticians have tried for a long time to establish precisely what is the human factor in the causation of accidents. Effective prevention requires such precise knowledge.

The contention of modern psychiatry that most accidents are not accidents at all but are caused largely by the victim's own disposition is but a confirmation of common observation. Strictly speaking, an accident is an occurrence, the cause of which is outside a person's control. A brick falling on a pedestrian's head is a completely accidental event, particularly if the pedestrian is not warned by a sign that such an event is likely to occur at a particular place. Most industrial, traffic, and home accidents, however, are of a different nature. The sufferer of the accident has some active part in its causation. It is popularly assumed that he was clumsy, tired, absent-minded; otherwise he might have avoided the accident.

From a paper presented before the Thirty-sixth National Safety Congress and Exposition, October 18-22, 1948, Sherman Hotel, Chicago, Ill.

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Scientific scrutiny, however, has established that most accidents are not favored by such simple human qualities. Many scientific discoveries appear at the first moment unexpected and improbable. So does the fact that certain people are prone to have more accidents than others, not because they are clumsy or absent-minded, but because of the total structure of their personality. The significant factor is not a particular isolated feature such as slow reaction or lack of intelligence but something much more basic which pertains to the totality of the person as an individual. Here are a few startling facts concerning the human factor in accidents.

More than 20 years ago, Marbe, a German psychologist, established the remarkable fact that the person who had one accident is more likely to have another one than the person who never suffered an accident (*1*). Statistical studies in large industrial companies have shown that accidents are not evenly distributed among the employees; that a very small percentage of employees have a very high percentage of the accidents. One might conclude from this that possibly those employees who have more accidents are those whose assignments are most dangerous. That this is not so, however, is demonstrated by the fact that those persons who have the most accidents in one kind of a job have also the most accidents in other kinds of jobs. Moreover, those employees who have the worst accident records in their jobs have also the most frequent accidents at home or on the way to work.

In a study of motor vehicle accidents in Connecticut it was established that over a 6-year period as few as 3.9 percent of the drivers involved in accidents had as many as 36 percent of all of the accidents.

One large company which employs a great number of truck drivers became concerned about the high cost of its automobile accidents and tried to analyze the causes of accidents in order to reduce the frequency. Among other procedures, the company examined the accident records of each driver, and finally transferred those who had the most accidents to other occupations. By this simple device it succeeded in reducing the accident rate to one-fifth of the original level. The most interesting fact in this study is that the drivers who had a high accident rate retained their accident habit in their new occupation. This shows irrefutably that there exists an accident-prone person and that these individuals are accident-prone in any occupation—in their everyday life.

After this highly significant fact had been established, the next problem was to determine those qualities in a person which make him inclined to have accidents.

It was discovered that the total personality structure was to be held responsible for the accident-prone individual. Dunbar (*2*) who, with the modern methods of psychiatry, studied a large number of fracture patients describes the accident-prone person as follows: He is decisive or even impulsive. He concentrates upon immediate pleasures and satisfactions. He is apt to act upon the spur of the moment. He likes excitement and adventure; he does not like to plan and prepare for the future. A large number of persons with the accident habit have had a strict upbringing and have derived from this an unusual amount of resentment against persons in authority. Briefly, they are men of action and not of planning, persons who do not interpolate much deliberation and hesitation between impulses and their actual execution. This impetuousness may have various reasons, but apparently rebellion against restrictions by authority and all forms of external coercion is its most common origin.

Planning and deliberation are potent factors which make one refrain from immediate rash action. The accident-prone person is essentially a rebel. He cannot tolerate even self-discipline. He rebels not only against external authorities but against the rule of his own reason and self-control.

Intensive psychoanalytic study of a few cases has allowed an even deeper insight into the intricacies of the emotional life of the accident-prone person. Particularly revealing were studies which scrutinized the emotional state of the person immediately before his accident. Dunbar, Menninger, Ackerman, Rawson, and others have shown that in most accidents there is an element of intention, though this intention is by no means conscious. In other words, most accidents are unconsciously intended. They belong to that category of phenomena which were described by Freud as the errors of everyday life such as misplacing an object, forgetting to mail a letter and carrying it for days in one's pocket, misspelling or mispronouncing a word. Freud showed convincingly that such errors are not accidental in the strict sense of the word but are unconsciously intended. When a president of parliament erroneously declared a meeting closed instead of opening it, he had some good but hidden reason for having the meeting over with before it started. A person who carries a letter in his pocket for days has some definite, although unconscious reason for not mailing it. Most accidents are similarly caused by unconscious motivations although they usually are of much graver consequence than these more harmless errors of everyday life.

Psychoanalytic investigations have revealed the nature of the unconscious motives which induce people to act in a way which invites accidents. The most common motive is a sense of guilt which the victim tries to expiate by self-imposed suffering, through self-imposed punishment. The unconsciously induced accident serves this purpose. A few brief examples will serve as illustrations. Ackerman (*3*) quotes the following case:

"A youth was driving his mother on a shopping tour. He begged her for the use of the car for a fishing party the following day. She refused, whereupon he fidgeted angrily, 'accidentally' stepped on the accelerator and sent the car into a ditch, injuring both himself and his mother."

The combination of revenge and guilt was obvious in this case. This young man punished his mother, but at the same time he punished himself.

According to Rawson (*4*) 60 percent of persons suffering from fractures, when studied psychiatrically, confessed guilt and resentment in their relationship to some person in connection with the accident. He illustrated this by such revealing examples as the following:

"A 16-year-old Puerto Rican said: 'It was really my fault because mother said supper was ready and I was not to go out. I went out anyway, got into a wrestling match and got my arm broken. Anyway, I guess mother's sorry she's so strict with me.' "

"A 27-year-old woman was hurt sliding down a bannister. She had always worked off annoyance with her parents and later with her husband by such tricks. 'Perhaps I ought to know better but I wouldn't have been like that if they had had more sense, and had treated me more like a person instead of being so strict.' "

"A secretary fell and fractured her hip. 'I asked my friends why I must be punished so. I can't remember ever having done anything wrong, but I must have done something terrible.' "

The basis of this strange combination of emotions is a deeply ingrained attitude prevalent in our present civilization—that suffering expiates guilt. If the child commits something wrong he is punished. Through the suffering caused by the punishment he makes up for his guilt, and thus deserves and regains the love of his parents. The same emotional attitude is at the basis of our criminal procedure. The offender serves his punishment, after which he can return to the community as a free person who has expiated his wrongdoing. The human conscience applies this same principle within the personality. The conscience acts as an internal judge who demands suffering for our wrongdoings. Suffering relieves the pangs of a guilty conscience and restores the inner peace.

The most common causes of guilt feelings in children are hostile, rebellious impulses against the parents. The accident-prone person retains his childhood rebellion against persons in authority even in his later life. He also retains the guilt reactions originally felt toward his parents. The combination of these two, resentment and guilt, is the most common factor in accidents. Those who have a great deal of this self-punitive urge constitute the majority of the accident-prone individuals. The guilt feelings are convincingly revealed in the frequent questions of the sufferer right after his accident, "Why did it happen to me? What did I do to deserve it?" These questions show that the guilt feeling, although not quite conscious, is vaguely sensed by the patient.

It was 20 years ago that I first became convinced of the unconsciously intended nature of certain accidents. I was consulted by a very intelligent man in middle life suffering from a severe depression which developed out of an unsuccessful struggle for existence. He came from a well-to-do and socially eminent family but had married into a different social stratum. After this alliance his father and family refused to have anything more to do with him. His unsuccessful struggle for existence through many years terminated (on account of neurotically determined inhibitions) in a total psychic collapse. I advised him to begin an analysis with a colleague, because I had personal relations with him and his family and was well acquainted with his previous history. He found decision difficult. One evening when the final decision about the analysis was to have been made, he asked to visit me in order to talk over the pros and cons once more. But he did not arrive; he had been run over by an auto in the neighborhood of my home. He was taken to a hospital suffering from many severe injuries. It was only the following day that I heard of the accident. When I discovered him in the third-class division of the hospital, he was bandaged up like a mummy. He could not move and all one could see of his face were his eyes, shining with a euphoric light. He was in good spirits, free from the oppressive melancholy of recent days. The contrast between his physical condition and his mental state was striking. The first words with which he greeted me were, "Now I have paid for everything, now I will at last tell my father what I think of him." He wanted to dictate a determined letter to his father immediately, demanding his share of his mother's estate. He was full of plans and was thinking of starting a new life (*5*).

What is most impressive in this story is the emotional relief which this patient gained from his injury. It freed him from the pressure of his guilty conscience which was stirred up by his extremely hostile feelings against his family who refused to recognize his marriage. After the injury he was ready to express freely all his resentment and tell his father what he thought of him.

Occasionally there are other unconscious motives at work in the causation of accidents, such as the wish to avoid responsibility, the wish to be taken care of, even the desire for monetary compensation. There is also some evidence of a correlation between accident proneness and certain isolated faculties, such as side vision, which cannot be discussed here. Another interesting correlation is between accident proneness and low blood pressure. Since blood pressure is correlated with certain personality constellations, the significance of this finding will have to be elucidated by future studies.

In summary, the accident-prone individual is an impetuous person who converts immediately into action his momentary impulses without deliberation and planning. He harbors a deeply ingrained rebellion against the early excessive regulations of his upbringing—a deep resentment against persons in authority. At the same time he has a strict conscience which makes him feel guilty for this rebellion. In the unconsciously provoked accident he expresses his resentment and revenge, at the same time atoning for his rebellion by his injury.

What can we learn from all this for the momentous practical problem we are interested in: the prevention of accidents?

Since the major factors in accidents are not external, such as defective machinery or unfavorable conditions like weather, darkness, and so forth, but lie in the person who has the accident, the primary measures must be directed toward the person. There are only two effective ways to approach this human factor: One is to change the individual and the other, to take the accident-prone person away from those occupations where the danger is great. Both measures require reliable methods by which the accident-prone individual can be spotted. Because the psychological factors which predispose an individual to accidents are not simple isolated qualities, they cannot be detected by the usual methods of psychological testing. The psychiatric interview, conducted by an expert, which reveals the whole previous life history of a person is the most, if not the only reliable method. The accident habit develops early in life and manifests itself in the youngster in a noticeable inclination to contract physical injuries, even if only minor. Also, the combination of excessive resentment and guilt manifests itself in early childhood in various ways familiar to the trained psychiatrist.

. To alter such an ingrained emotional pattern as is characteristic for the accident-prone individual by psychotherapy is a major therapeutic task. It requires prolonged treatment and is, therefore, in the present state of psychiatric facilities, of no practical significance. The recognition of the accident-prone person and his removal from occupations which are dangerous for him and for the public is, at the present, the only effective measure.

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Accident Prevention—A State Health Department's Responsibility

By F. C. Beelman, M. D.*

There was a time when hazards to life were so great that the annual toll from accidents passed unnoticed. The ravages of uncontrollable disease brought fear and despair—not only to individuals and families but to large cities. Just a lifetime ago recurrent epidemics decimated the younger population groups in entire communities. Infant diarrhea snuffed out the lives of thousands of infants shortly after birth. Smallpox, diphtheria, typhoid fever, yellow fever, scarlet fever, and tuberculosis were only a few of the more prevalent diseases threatening the lives of the youth of our Nation.

The compound microscope, with its oil immersion lens and the new world of bacteria, advanced medicine into a new era of scientific truths. Since the 1890's, in almost every State there have been constantly increasing efforts to avert preventable diseases and deaths. Public health and preventive medicine, the application of new medical skills, immunizing agents, and drugs, have changed the leading causes of death. In no group is this change more striking today than in the younger population. The first reliable mortality statistics for Kansas were tabulated in 1916, and by comparing causes of death in 1916 with those for 1947, a graphic story emerges concerning health progress in only 31 years. In 1916 there were 1,548 deaths from acute communicable diseases. In 1947 there were only 290 such deaths. For children of school age the mortality decrease is even more remarkable. In 1916, 318 children between the ages of 5 and 19 died from acute communicable disease, as compared with only 20 in the year 1947.

Many factors must be considered in giving credit for the remarkable changes that have occurred in the causes of sickness and death as compared with 30 years ago. The activities of preventive medicine and public health personnel, without doubt, have been the dominating factor in this approaching victory over the common diseases which were formerly the leading causes of sickness and death. However, in this optimistic résumé of the achievements of preventive medicine there is one discordant fact—one leading preventable cause of death and disability, which has not kept pace with its mates of half a century ago, is accidents. The estimated acute communicable disease death rate for Kansas during 1916 for ages 5 to 19 was 61 per 100,000 population, as compared with the rate of 4 for the year 1947—a decrease of 93 percent. Compare the accidental death rate for the same years and the same ages. It was 40 for 1916, and 35 for 1947—a decrease of only 12 percent.

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*Executive Officer, Kansas State Board of Health.

Unfortunately, there are only meager statistics available indicating the status of accidents as a factor in nonfatal, temporary disability, or crippling injuries. That the magnitude and seriousness of this phase of the accident problem goes unrecognized is demonstrated by lack of interest and initiative in the development of accurate statistical studies on nonfatal injuries.

Death statistics, however, are complete and indicate clearly the current risk from accidental death as compared with all other causes. For Kansas, in 1947, accidents were the fourth leading cause of death for the total population, but for all ages, up to 35, they were the leading cause of death. Further analysis shows that for ages 5 to 19, children of school age, accidents represent more than one-half of the total deaths. Specifically, 172 children in Kansas between the ages of 5 to 19 years were accidently killed in 1947. Contrast the relative importance of these 172 accident victims to the 20 dying from acute communicable diseases. In any State, accidents kill two to seven times the number of persons who die each year from tuberculosis. Many more are crippled through accidental injuries than are disabled by "the great crippler—poliomyelitis."

Accidents are, perhaps, the most preventable of all the misfortunes of mankind. People cannot be immunized against them—they must know how to avoid them. From the available records it seems that some small progress may have been made in accident prevention. Yet, at the present rate, it will be many decades before accidents have undergone a decline comparable to the experience in the control of communicable diseases. Are State health departments, which, in the past, have initiated and put into operation programs that have contributed so much to the saving of lives through communicable disease control, neglecting this leading cause of death of our young people? Or, fully aware of the devastating scope of the accident problem, are they convinced that nothing actually can be done about it?

To answer these questions fairly, and without prejudice, a questionnaire was prepared and mailed to every State health officer. An excellent response was obtained. Forty-one or 85 percent completed and returned the questionnaire. Three State health officers replied that, in their departments, nothing was done toward accident prevention. All the others carried on accident-prevention activities to some extent. The questions and information obtained follow:

The first question was: "In what place do accidental deaths rank as a cause of death in your State?" Two States, Nevada and Idaho, reported accidents as the second leading cause of death. In 9 States, Texas, Utah, Louisiana, Montana, New Mexico, California, Arizona, North Dakota, and Florida, accidents ranked third; in 19 States, fourth; and in 7 States, fifth as a cause of death. One State each reported accidents as the sixth, seventh, and eighth cause of death. In 31 out of 41 States, 75 percent of the accidents ranked fourth or higher as a cause of death.

The second question was: "To what extent should State health departments engage in accident-prevention activities?" Ten State health officers replied that it should be a major activity; 27 stated it should be a minor activity; 3 did not commit themselves, and 1 stated it should not be a function of State health departments. Recognition of the responsibility of the State health department in the field of accident prevention is clearly indicated by the 25 percent which felt it should be a major function, and the 66 percent which indicated it should be a minor activity.

The next question, entirely in the realm of speculation, was: "In your opinion, what would a major accident-prevention program in the State health department, operating on a divisional basis (comparable with tuberculosis control), accomplish in decreasing the accidental death rate for your State?"

Five State health officers replied that with this type of program the accidental death rate could be reduced 25 percent; 12 estimated a 15-percent reduction; 9 States—10 percent, and 6 States—5 percent. Nine State health officers gave no opinion.

Even the reduction of 10 percent, or more, which 64 percent of health officers believe could be accomplished, would result in a greater saving of lives than in many other areas of intensive public health activity.

The fourth question was: "What is the extent of your State health department's organization responsibility for accident prevention?" None of the States, at the present time, has a major division with full-time personnel engaged entirely in accident prevention activities. New York is the only State with a minor bureau with full-time personnel. Additional information obtained from New York is as follows:

> The New York State Department of Health embarked upon a Home Farm Safety Program in 1942. This was carried out essentially as a public health educational program and consisted of the employment of two field workers to work with State and local organizations to stimulate interest in this field. Recently the program has been transferred to the Division of Medical Services as a Home Accident Section. It is now planned to expand the services to include a more complete public health approach. Public health education will still comprise a major portion of the program but it is also planned to conduct epidemiologic studies in hospitals to determine more accurately the circumstances leading to the occurrence of accidents and to detect the accident-prone individuals. A further step will be to establish adequate clinical facilities to assist the accident-prone person, whether his proneness be attributable to physical or psychologic disorders.
>
> In 1947 there was established in this State a Division of Safety which operates as part of the Governor's office. The purpose of this Division is to coordinate the

safety activities in all State departments. While this Division is still in the stage of planning its program, it potentialities are great. Obviously a home accident program reaches into other phases, as injuries suffered in the home will affect attendance on the job and in schools The accident-prone person will have accidents in the home as well as on the highway and on the job. Through the Division of Safety, each of the departments concerned in accident prevention can meet and plan combined programs which will assist in reducing the over-all accident rate. Actually only one meeting of this type has been held so far, but plans have been made to get the program going.

Many of the States are carrying on some accident prevention work as a part of the activities of various State health department divisions.

Activities	*States*
Health education services	31
Maternal and child health	13
Industrial hygiene	29
Vital statistics	24
Division of sanitation	15
No activities	2

The fifth question was: "What type of accident prevention activities are carried on in your State health department?"

26 States carry on special statistical studies on accidents.
6 promote organization of local safety councils.
4 coordinate State-wide accident prevention activities.
16 furnish consultation services to other State departments on accident prevention.
1 State health department lends personnel to other State departments.
19 participate in State safety council activities.
11 prepare and publish special reports on accidents.
5 prepare and publish pamphlets.
7 prepare and publish posters.

Safety Inspection Services

18 States carry on safety inspection services in industry.
11 inspect public buildings for safety measures.
7 inspect mines for safety practices.

Health Education Services

27 States prepare and release newspaper articles.
15 prepare radio releases.
21 have talks given by personnel.
27 distribute pamphlets on accident prevention.
16 distribute posters.
24 distribute films on safety.

It is evident that health department activities now concern themselves largely with the study and educational aspects of accident prevention. A few are entering on more specific control programs such as promotion, assisting in forming local safety councils, coordination and inspections. Sixty-six percent of those replying are developing programs.

The sixth question concerned itself with personnel, and it is an important question: "Indicate the number of health department personnel engaged in accident prevention activities." Answers to this question were disappointing as the totals indicated relatively few persons are actually engaged in accident prevention programs in State health departments.

	Personnel
1 State—full-time employment	2
1 State—full-time employment	1
1 State—half-time employment	2
1 State—half-time employment	1
30 States—small amount of time	170

The seventh question asked for some indication as to the amount of money that was being spent for accident prevention programs: "What is the estimated amount of funds expended on accident prevention by your State health department?"

Replies revealed the following approximate expenditures:

Amount	*States*	*Amount*	*States*
$1,000 or less	15	$5,000	2
$2,000	4	$8,000	1
$3,000	1	$10,000	2

12 States did not make a statement.

Answers to the sixth and seventh questions indicate that State health departments have not, as yet, seriously undertaken the task of accident prevention. Any State-wide program, to be effective, must have full-time trained personnel, with an adequate budget. In the control of tuberculosis, which kills approximately 50 percent of the number lost through accidents, State health departments are spending more than $10,000,000 and have a small army of trained personnel of at least 10,000. It would be decidedly interesting to see what might be accomplished if forces of that magnitude were available and functioning in the field of accident prevention.

In the eighth question an attempt was made to obtain information from the health officers relative to other State organizations and departments outside the health department that were active in the field of accident prevention.

Twenty-four States listed a State safety council; 6 States had a safety commission; 5 States, a safety committee; 3 States, an industrial safety commission, and 7 States had a public safety department.

In 31 States accident prevention activities were carried on by the highway departments, and in 16 States by the department of labor. Departments of education were listed as participants by 21 States, and offices of the State fire marshal by 17. Other State departments mentioned were: State police, commerce department, insurance department, and Workman's Compensation Commission. In most

States, one or more State organizations were active in the field of accident prevention.

Twenty-five States had regular appropriations for safety to a State agency; 11 had no State appropriations, and 6 gave no answer. Twenty-eight States had full-time personnel which totaled approximately 212 persons; 9 did not have full-time personnel, and 4 gave no answer. One question was asked as to the scope of accident prevention activities by these various State agencies. The answers showed that:

13 carried on programs to control all accidents.
25 carried on only highway and traffic accident prevention programs.
15 engaged in home accident prevention.
15 included farm accident prevention.
15 industrial accidents.
14 school accident prevention.
15 included fire prevention safety programs.

This brief review of information from 41 State health officers presents a fair picture of the progress which is being made toward the development of accident control programs within State health departments.

Accidents can be prevented and it is reasonable to assume that the death rate can be decreased directly in proportion to the effort made. Agricultural accidental deaths in Kansas in the last 15 years have decreased 32 percent. At the same time the use of farm machinery has increased many times. Farm organizations—stimulated by State agencies—have hammered home the cold facts of agricultural hazards through accident prevention programs. The excellent and wholly practical efforts of many farm youth organizations have paid off. Not to be discounted have been the safety changes and measures worked out by interested, cooperative manufacturers of farm equipment. It is reasonable to expect this specific death rate to decrease more rapidly through a well-organized agricultural safety program, promoted by trained personnel and funds to carry out activities.

Accidental poisonings in the home have decreased over the last 15 years approximately 50 percent. The press, radio, magazine articles, and the cooperation of drug manufacturers, together with legislative action, all have contributed to this reduction.

In the field of industry many large manufacturing plants have done a remarkable job in controlling accidental injuries. Perhaps the most outstanding example of what active and planned safety programs can accomplish is the death trend in railway accidents. Today, in Kansas, the average annual loss is less than one-half the number of deaths which occurred 15 years ago. This reduction is not due to mere chance. It is the result of hard and earnest efforts of the labor organizations—railway workers—and railroad management.

State health officers who are responsible for the development of health programs are, in general, fully aware of the seriousness of the accident problem. They further believe that control measures can reduce the death rate. In fact, 26 or 60 percent of the questionnaires returned indicated that accident prevention on a divisional basis comparable to tuberculosis control would reduce the accidental death rate 10 percent or more. Yet, only 10 of these 26 health officers thought that accident prevention should be a major activity of the State health organization. If these replies are accepted only in part, it is clear that State health departments are allocating grossly inadequate funds and personnel for accident prevention activities in relation to the seriousness of the problem and their belief in what may be accomplished. On the other hand, most State health departments are going through a period of rapid growth in the reorganization and realignment of forces to tackle major health problems. High on that list of problems—and one that will not be passed over—is the increasing number of Americans who are accidently killed, crippled, and injured needlessly.

State-wide accident prevention programs are still in the experimental and planning stage. There is, apparently, no Nation-wide uniform well-organized agency—either official or voluntary—with full-time personnel and funds actively covering the broad field of accident prevention. Many States have funds appropriated for various phases of accident prevention. No specific Federal funds, or national voluntary agency funds, appear to be available to States for demonstrations, program planning, or the training of personnel in the field of accident prevention.

The many facets of the accident problem demand that a great variety of forces work together for its solution. Many organizations, State and local governmental agencies, industries, schools, farm bureaus, railroads, and safety councils, will be actively engaged in controlling accidents in which they may be specifically interested. In recent years motor vehicle and traffic accidents have received wide attention. As a result, more States have organized programs within State highway departments—working on this specific problem—than in any other accident field. This has been aided by Federal grants to the States for highway construction. State labor departments are interested in occupational and industrial accident prevention. Industries have done an outstanding job in solving their own accident problems. On the other hand, several important aspects—home accidents for one—have not, as yet, been considered.

The majority of State health officers believe that the accident problem is a public health problem. It will require broad, coordinated community action for its solution. The first step toward an accident prevention program—that of obtaining detailed information on accidental deaths—has already been taken by many States. Approaching the problem through both the individual and his environment offers plenty of action with favorable odds for success. Items for administrative action would vary as developing programs are reconciled with legal responsibilities, personnel, and funds of State health departments. The following items, however, would constitute the basic structure around which a State-wide program could be formulated:

1. The collection and interpretation of statistical information in order to obtain detailed knowledge of the accident problem is essential. Nonfatal accidents which result in permanent physical impairment should be studied.

2. Education: Bringing to bear on the individual, through every avenue of approach, those educational techniques essential to habit formation. Conditioning of the individual to the end that right action, at the right time, in situations which are hazardous or a potential hazard, is the only approach that offers any possibility of success. Awareness or the recognition of possible dangerous situations, and the building of sound judgment, can be accomplished through conditioned experiences. As a part of health education, it would be necessary to weave accident education throughout the school experience of the individual. Through adult education, family participation could be enlisted to carry on essential home responsibilities in this educational process. The educational pattern established would revolve around the school, family, and community.

3. Promotion: Continuous, promotional activities would be necessary to produce community action. The development of local safety councils, which may be committees of local health councils, are effective in providing community leadership.

4. Coordination: Accident prevention requires broad, coordinated action for its solution. Many organizations, both voluntary and official, have specific interests and responsibilities. To keep them functioning efficiently, with a minimum of overlapping and friction, would mean the difference between the success and the failure of the program. This can be done best through the local and State health departments.

5. Demonstrations and evaluation: The establishment of controlled demonstrations in an effort to develop the most effective accident prevention program would be essential. Home accident prevention programs could be developed, promoted and actively carried out by local health units. Evaluation of efforts, techniques, and programs should result in progressive improvement.

Let's apply an accident problem to this pattern and see how it works—keeping in mind the individual and his environment. In

Kansas, the automobile accident is the leading cause of death in the age group of 15 to 20 years; therefore, the automobile in the hands of a boy or girl of that age is a deadly instrument unless experience, judgment, and proficiency in its use is brought into the situation. In one actual serious accident, a front wheel of an automobile dropped off the concrete highway slab into the rut along the side. The teen-age driver whipped the car hard to the left to bring the wheel back onto the road. The wheel suddenly responded—the car shot across the highway and skidded into a bridge abutment, killing four of the teen-age occupants. We know from detailed knowledge of the specific accident hazard that this is not an uncommon cause of automobile accidents—the rut is an environmental factor and the teen-age driver is an individual factor.

A required driver's training course, a part of which is devoted to actual experiences in driving with a qualified instructor going through simulated known hazardous situations, should produce a degree of proficiency and judgment. The course should be a part of every school curriculum and should be required for the obtaining of a driver's license. Had the driver been conditioned to meet this particular situation by slowing down and keeping the wheel in the rut instead of whipping the car hard to the left, back onto the road, it might have prevented a serious automobile accident which cost the lives of four persons.

The second approach to the accident problem through changes in the environment is also well illustrated by this accident In addition to conditioning the driver to known hazards, the accident might have been prevented by the highway department's filling the rut at the edge of the highway. Changes in the environment which are hazardous, or potentially so, offer great possibilities in the control of accidents. The importance of coordination of organizations is brought out by the need for calling the attention of the highway department to the fact that ruts at the edge of hard surface roads are hazardous and are the direct cause of many automobile accidents. Through promotional activities, a local safety council can be organized which, in turn, could bring, when necessary, community action to bear on highway departments to keep the edge of highways in good condition.

Accidents follow patterns. Specific environmental hazards can be corrected. The individual can be conditioned to protect himself and others. Many factors peculiar to certain individuals contribute to accidents. Uncontrolled emotion such as anger can be a factor--fatigue, worry, physical handicaps, sickness, and alcohol, all play a part, at times, in serious accidents. Who the accident-prone individual is and what makes him different from anyone else is still a question. Any of the above uncontrolled factors could contribute to repeated, serious accidents experienced by any individual. Through accumulated,. centralized information, these individuals might be found and brought under control.

Basically the problem is one of education and could be handled by a sufficient number of health educators in State and local health departments. Working full-time on the job of accident prevention, the problem would be one of State-wide promotion, organization, education, coordination, demonstration and evaluation. The thinking and action of engineers and other experts in various fields could be brought to bear on problems as necessary. Manufacturers can cooperate in changes to machinery, automotive equipment and other *products to increase safety.*

Summary

Thousands of deaths and injuries from accidents today constitute a formidable public health problem. However, its solution may not be as difficult as many of the public health problems already tackled and solved by the indomitable courage and energy of pioneering health workers.

It is evident that progress is slowly being made by State health departments in assuming responsibilities in the accident prevention field. The increasing seriousness of the problem warrants greater effort on the part of all interested State and national health organizations. Only through organized and coordinated activities embracing the concerted action of official and nonofficial organizations can we hope to curb this needless loss of life.

Accident Prevention Research

By Barry Griffith King, Ph. D.*

The causes and prevention of accidents can best be determined by what is called the convergent type of research. This term was originally used to mean that a number of scientific disciplines or specialties were brought to bear upon a specific problem. In this presentation the term "convergent" is used in its broadest sense so that the experimental plan calls for: (*a*) Investigation and analysis of all types of accidents for identification and better understanding of common factors and of laws of cause-effect relationship which are generally applicable for accident prevention; (*b*) the conduct of a broad program of experimental studies; and (*c*) utilization of organized teams of specialists, each contributing the unique talents and applying the special knowledge and techniques of his professional field. The teams should include, but not necessarily be restricted to, competent representatives for statistics, biometrics, preventive medicine, all branches of engineering, industrial hygiene, and for all of the ancillary medical sciences and other related biological sciences. The emphasis which is given to any one of the arts or sciences should vary with the nature of the problem under investigation and the professional specialties of those within the immediate working group.

The purpose here is to present a general plan for experimental studies of certain biological factors which may act in causing or preventing accidents, and to discuss some aspects of the integration and application of the results of all types of studies directed toward accident prevention. In a number of instances experimental details and suggestions have been presented. This is not done with the intent to establish specific lines of procedure, but rather to submit a definite plan of action.

Investigation of Biological Factors

The proposed plan calls for establishing and testing the four following hypotheses:

1. Accident proneness is a clinical entity.
2. Physical impairment is a contributing factor in accidents.
3. Accidents will increase in frequency when the lowest level of human tolerance to stress is exceeded; the frequency and severity of accidents will be related to the degree to which the stress exceeds one or more of the higher tolerance levels.
4. Consideration of human requirements in the design of machinery, devices, and procedures will reduce the incidence of accidents.

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Hypothesis 1. Accident proneness is a clinical entity

The finding that a relatively small percentage of the accident group is responsible for a high percentage of the total accidents does not constitute proof of the existence of accident proneness as a clinical entity. It does not identify biological characteristics invariably associated with this special susceptibility, nor does it preclude the possibility of a greater exposure[1] of the "accident prone" group to hazardous situations. The test of the hypothesis lies in the success or failure to identify causal physiological or psychological characteristics, or their combination, present in individuals showing a high frequency of accidents, and absent or present to a lesser degree in "accident free" individuals with a comparable background of experience

The first step would be to establish two groups of adequate size for the comparative study. The following factors should be considered in setting up the groups:

(*a*) Individuals in both groups should be clinically free of physical impairment and organic disease. The influence of these factors should be considered separately. The apparent state of physical fitness should be thoroughly checked by medical examination.

(*b*) Age limits should be established to eliminate children and the aged The influence of general inexperience, lack of instructions adequate to cover the variety of new situations encountered, and relative lack of discipline would tend to obscure interpretation of the results of studies which included children. The aged should be eliminated to preclude the influence of the poorly defined as well as the demonstrable senescent changes.

(*c*) The corresponding individuals in the two groups should be matched with extreme care in order that the subsequent comparison will be valid.

(*d*) Each group should include people living under a wide variety of circumstances and conditions ranging from those commonly considered safe to those generally acknowledged as hazardous. The inclusion of people subject to relatively great hazard should increase the opportunity to identify "repeaters" and increase the likelihood that a significant proportion of the accident-prone individuals, if such exist, have been involved in accidents. The reason for selecting subjects living under "safe" conditions is to insure that individual susceptibility will not be masked by an overwhelming opportunity for injury.

The preliminary screening for the selection of experimental material might be accomplished by study of the records of holders of personal and property accident insurance policies, those participating in group health or similar organizations, workers in industry, men and women in the armed forces, and licensed or certificated operators of motor vehicles including aircraft. Family physicians and local authorities in areas of relatively stable populations should be interviewed to obtain the names of people to represent the domestic, traffic, agricultural, and small-business situations for both groups.

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[1] Criteria selected for determining exposure rates are not always reliable Miles or hours driven in automobiles do not reveal traffic conditions which vary with many factors, including the amount of driving in urban or rural sections, and the time of day In aviation the frequency of individual flights may possibly constitute a more significant criterion than miles or hours flown (which are closely related) since landings and take-offs constitute the more hazardous phases of flight.

The initial groups should necessarily be large, since practical considerations will reduce the number that can be enlisted as subjects for the subsequent study. The fact that only a small number of subjects may be available for study in any one location need not be discouraging, provided that the research techniques are standardized so that the findings may be pooled.

The laboratory phase of the investigation should include a complete physical examination with quantitative description of vision and hearing, and personal interview to obtain as comprehensive case histories as possible. Inquiry should be made to determine the individual's experience with accidents in situations determined by conditions other than those related to his occupation; any tendency of the subject to consider himself "lucky" or "unlucky" in everyday life may be revealing.

The other phase of laboratory study may be conducted by determining the subject's response to a suitable battery of tests. The selection of critical tests is admittedly difficult, but it may be profitable in tentatively establishing a standardized procedure to select individual tests to measure manual dexterity; reaction time; attention; ability to interpret and follow instructions; judgment when allowed free choice of alternate methods of performing a given task; frequency of interruption through initiating or participating in a conversation with a cosubject; and indices of emotional reaction revealed by changes in blood pressure, heart rate and respiratory pattern, flushing, perspiring, and muscular tremor.

While considerable effort has been directed toward the study of those who have sustained accidental injury, too little emphasis has been placed upon the study of accident-free individuals. Such study is, however, essential for testing the accident-prone hypothesis.

Here, as elsewhere in the over-all program for research in the field of accident prevention, techniques of multivariate analysis provide a powerful tool in the statistical treatment of the results. Accident proneness, if such exists as a clinical entity, may be extremely complex, and thus escape identification when attributes of character or performance are considered singly.

Hypothesis 2. Physical impairment is a contributing factor in accidents

Knowledge of the influence of physical impairment is essential for preventing accidents and establishing a factual basis for determining what restrictions or limitations, if any, are required to provide protection of physically impaired individuals and of the public. Constructive measures cannot be satisfactorily undertaken in the absence of adequate knowledge. Studies on the incidence and severity of accidents of the physically impaired have been concerned with populations in which some degree of selection has occurred. While such studies have accomplished their intended purpose of dealing with specific situations, this selection has obscured the basic question and limited the general applicability of the results.

The test of this hypothesis lies in a comparative analysis of the performance data of representative groups of individuals with and without physical impairment. In addition to matching the individuals in the groups, the following factors should be considered in the choice of samples:

(*a*) Age limits should be extended to include the aged. Where adequate histories can be obtained, this would afford an opportunity for comparing records of the individual before and after the development of such physical decrement as may result from senescence.

(*b*) People living under a wide variety of circumstances and conditions, with accident-free and single-accident histories, should be included to minimize the bias of voluntary, proprietary, or occupational restrictions leading to the reduction of hazardous exposure.

(*c*) The one group should include as many types of physical deficiencies and as many degrees of these impairments as is possible, while the other should be restricted to people who exhibit no impairment and do not require any corrective devices (such as lenses or supports).

The subsequent study of the individuals should stress personal interview, but should also include laboratory tests which are designed to measure attention, ability to receive instruction, judgment when free choice of methods is offered, precision of voluntary movement, and diagnostic or performance tests to supply quantitative measures of impairment in terms of strength, freedom of movement, or sensory deficit.

Individuals with physical impairment who have performed successfully over a wide range of situations may reveal inherent or acquired attributes which are effective in acting toward the prevention of accidents. Comparison with the "accident free" group of the accident proneness study may be profitable.

In the programs proposed for testing the first two hypotheses, the assumption that one of the comparative groups is serving as a control group should be avoided. Since both the causes and the methods of prevention of accidents are under consideration, there is equal concern for the protective and for the predisposing physiological and psychological characteristics which may be contributing factors.

Here again multiple correlations must be thoroughly investigated. This search for significant combinations as well as individual characteristics is fully justified since the two hypotheses are directed toward a study of man, with little or no concern for the influence of the stresses or design deficiencies which may also act in determining an accident.

Hypothesis 3. Accidents will increase in frequency when the lowest level of tolerance to stress is exceeded; the frequency and severity of accidents will be related to the degree to which the stress exceeds any one of the higher levels of tolerance

A considerable program of research in stress physiology is a prerequisite to evaluation of this hypothesis; further, since it deals with "stress" in general, it will be necessary to (*a*) consider different types of stress and (*b*) select criteria for the various levels of human tolerance which are applicable for describing the results of all, or the majority, of the stresses.

The following classification of stresses is submitted for reference. Such classifications are necessarily arbitrary so that alternate treatments may serve equally well.

STRESS

I. *Physical*
  - (*a*) barometric—total pressure; partial pressure of component gases.
  - (*b*) thermal—heat; humidity; cold.
  - (*c*) mechanical—acceleration; deceleration; static loads; vibration (including noise).
  - (*d*) radiation—infrared; visible; ultraviolet; roentgen; gamma rays; (cosmic rays?).
  - (*e*) electrical.

II. *Chemical*
  - (*a*) toxicological, as used in its broadest sense to include noxious gases,[1] asphyxiant gases,[1] irritants, injurious solutions and poisons.
  - (*b*) pharmacological.

III. *Biological*
  - (*a*) deficiency—thirst; nutritional.
  - (*b*) dynamic—posture; work.
  - (*c*) psychological.
  - (*d*) aging and disease.

The following criteria for determining the various levels of human tolerance, based upon biological responses common to most, if not all, stresses, are suggested:

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[1] Alternatively, these might be considered equally well as "partial pressure" stresses.

(*a*) Threshold level for perception of the stress.

(*b*) Level at which measurable bodily compensatory changes occur (such as increase in respiration or heart rate or postural reflexes).

(*c*) Level at which the compensatory mechanisms fail, allowing for significant impairment in the physical condition of man.

(*d*) Level at which man is no longer able to take the steps necessary for his further protection or survival.

(*e*) Level at which survivable but serious injury (either permanent or temporary) occurs.

(*f*) Level resulting in death.

The rank order of these levels must be rearranged to indicate increasing severity for different types of stress. For example, this order is satisfactory for exposure to the chemical stress, carbon dioxide in harmful concentrations, and the physical stresses, infrared radiation and deceleration. It would not be satisfactory, however, for methyl bromide under certain conditions of exposure (concentration x time) where (*e*) and (*f*) might occur without this noxious gas being perceived, or any compensatory reaction or immediate impairment in performance resulting.

For the most part, the level of perception of a stress is well below that which will cause injury, but unfortunately this is not invariably the case. However, even when the stress does not cause marked physiological reaction or tissue damage, it may be a contributing factor in accidents, since recognition, by definition, implies some degree of distraction and divided attention.[3] Since any serious consideration of comfort was, at one time, considered to be "coddling," this author has employed the term "distracting discomfort" to emphasize that some impairment of performance potential must necessarily result from divided attention. Further, if a stress is perceived, or even suspected, it may cause fear or alarm out of all proportion to its hazard for bodily injury. This may be illustrated for an aviation situation where gasoline fumes, even in innocuous concentration, or water vapor, mistaken for carbon dioxide escaping from the fire-extinguishing system, may cause alarm, distraction until the danger is evaluated, or decision to take action warranted only in a true emergency.

The effects of mild or moderate stresses frequently cannot be demonstrated in terms of individual performance decrement in laboratory studies or in field experiments simulating emergencies. For this reason, it is suggested that the investigators concerned primarily with studies of the cause and prevention of accidents attempt to measure the *compensatory reserve* of the body, or its systems, rather than performance decrement as the index of stress. This could be accomplished by imposing a standard conditioning stress which would, in itself, fail to bring about a measurable compensatory reaction; the stress under investigation could then be applied in increments to attain successively increasing intensities until a measurable response occurred. Such procedure could be repeated, if necessary, at higher levels for the standardized stressful condition where it is desired to determine the point of failure of the compensatory mechanism.

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[3] It is recognised that in certain situations distracting influences are advantageous, e. g., the case of the sleepy automobile driver.

There are several points in the study of intense stresses which warrant the attention of the accident investigator. The lower portion of a strength-duration chart to identify the various levels of human tolerance to exposure to stress can be carried out by planned experimentation. Data from even highly motivated subjects can, however, define only the points lying below the level of injury, so that animal experiments, studies with cadavers, and full utilization of natural experiments, i. e., accidents, are necessary to determine the areas of the more extreme effects. While studies of cadavers are of limited usefulness and applicable to only certain stresses (deceleration, static load), their value would be greatly increased in these situations if parallel studies on live, freshly dead and embalmed animals were used to indicate the direction, if not the extent, of the changes which occur, as an aid in interpretation of the results.

It is admittedly difficult to obtain comprehensive, quantitative data from natural experiments; this may be the principle deterrent which so frequently results in the failure to conduct an orderly, thorough, and intensive investigation of accidents. While it may be impossible to determine the absolute values of the stress or stresses which were involved, they may be approximated to the extent of bracketing them within a certain range. For example, in accidental death from toxic gases, the maximum and minimum concentrations which could have existed can be determined; in electric shock cases the circumstances of the accident can be reconstructed to afford approximate values of contact impedance, current, current pathway, and probable duration of exposure. A sufficient accumulation of such data will aid immeasurably in defining the areas of the higher tolerance levels.

Hypothesis 4. The frequency and severity of accidents are related to the adequacy of the design of machinery, spaces and procedures in providing for human requirements

A broad program of investigation must be carried out in order to test this hypothesis. It will be necessary to—

(*a*) Develop a number of quantitative descriptions of man as a basis for specifying human requirements for a given situation or condition.

(*b*) Evaluate existing designs in relation to these specifications.

(*c*) Establish designs for fitting machinery and procedures to man.

(*d*) Determine correlations between the incidence and severity of accidents and the degree of success or failure with which specific designs provide for human requirements.

A list of the characteristics of man which require complete quantitative description include:

(*a*) The classical anthropometric dimensions such as weight; stature; sitting height; length of arms and legs; arm and foot "reach" at various points in space; and width, depth and girth at various levels along the longitudinal body axis. The descriptions of dimensions which are influenced by body posture must, however, be based upon measurement of the subjects in habitual, easy posture rather than the standardized and somewhat unnatural anthropometric positions, since the latter are seldom of use for engineering design.

(*b*) Sitting and standing eye level (in natural posture); total field of vision when eyes are fixed, when eye but not head movements are permitted, and when head but not body movements are permitted.

(*c*) Orderly summaries of the degree of freedom of movement, and the precision and force of movement, of the component parts of the body, with and without body support and with various degrees of flexion, extension, rotation, abduction and adduction.

(*d*) Descriptions essential for comfortization to minimize postural and work stresses.

(*e*) Summaries of latent periods; reaction times; manual dexterity; time required for arm, hand and foot travel and positioning; time for hand and foot operations; time required for check and interpretive reading of instruments.

Machine design requiring operations which have not been related to man's physical characteristics or his psychological capabilities constitute a major confounding factor in accident analysis. In many cases the human elements described under the general classification of "error in judgment," "lack of attention," "pilot error" and "deviation from rules of safe practice" may, perhaps, be explained to a large extent by inadequacies of design. In other cases, faulty design may be a contributing but not the primary factor in accidents. The likelihood of breaking down these large general categories will be greatly increased when the influence of inadequacies of design have been eliminated.

It is clearly the responsibility of those in preventive medicine and in the various biological fields to develop these essential descriptions as a factual basis for providing for human requirements in the design of spaces, machines and operational procedures. Until recently, biologists have not accepted this responsibility, so that the engineer has had to use estimated "average" values and apply a percentage factor to provide for individual variation. This is unsatisfactory because (*a*) the use of average values in designing machinery or structure for individual use results, by definition, in arrangements which are unsatisfactory for 50 percent of the population, and (*b*) the safety or general allowance factor is based upon a poorly established value so that the percentage provided for by this procedure cannot be predetermined. Average values serve only the special case where the structure is designed for simultaneous use by groups of 30 people or more, and where the pertinent variable, such as weight, is normally distributed in the series. If quantitative statistical descriptions are available to the engineer, he can select his cut-off points with full knowledge as to the extent of his provisions.

Integration and Application of Results

Cumulative treatment and correlation of data from studies of the numerous phases of investigation of the cause and prevention of accidents present a formidable task. The effort would, however, be justified by the increased rate of accomplishment of the over-all program. Such a plan could be put into effect by establishing a central repository for the experimental results and maintaining an adequate staff of specialists with full-time responsibility for treatment of the data.

The initial activity of this group should be directed toward analysis and integration of existing data, both as a pilot study for analytical procedures and as a basis for evaluating detailed experimental project proposals to insure the completeness of the plan for obtaining all necessary items of information. The staff should then turn to analysis and integration of the results of both current biological studies and the statistical and engineering investigations which may be presumed to be proceeding concurrently.

A considerable emphasis should be placed upon the use of advanced statistical techniques, particularly multivariate analysis. This is a practical method of studying the effect of interaction of a set of causes, especially where some causes cannot be subjected to physical measurements. Provision should be made for the use of these methods in the attempt to relate the many factors which in combination may cause or prevent accidents, and also for the extension of theoretical mathematical statistics to techniques particularly adaptable to the field of accident control.

An additional function which might be performed effectively by the staff of specialists would be the task of dissemination and early application of results. If the accident-proneness hypothesis were found to be valid, research investigators could be encouraged to initiate studies for the development of therapeutic measures or methods for the reeducation of accident-prone individuals. As successive comprehensive descriptions of man are completed, design engineers could be advised of the findings.

There is a serious time delay in the use of existing knowledge and this will inevitably continue unless groups of scientists, having a broad knowledge of field conditions and practical limitations in operating procedures, assume responsibility for acting as intermediaries between the laboratory and the field. In general, research investigators are reluctant to concern themselves with application of their findings, so that special provision must be made for carrying out the essential step of digesting and interpreting research results and advising the applied specialists as to their utilization.

All the knowledge gained by the studies on human factors would be of permanent value not only for prevention of accidents but also as a contribution to the fund of scientific knowledge. The information derived from the study of current cultural situations may be expected to reveal general principles of safety design and rules of safe practice, even though information concerning specific devices or arrangements will become obsolescent at intervals which will depend upon the rate of introduction of new devices.

The Home Environment and Accidents

By Leonard M. Board, M. P. H.*

The role of the home environment, in its physical rather than sociological sense, as a cause of accidents has been accepted generally, but it is not yet possible to assign relative values to the various environmental hazards involved in the several types of accidents. Recognizing the evident need for extensive research and study of home accident causation, we are obligated at the same time to appraise all available data and glean from it such valid information as can be employed in mapping sound preventive measures.

The National Health Survey—a pioneering effort to obtain morbidity data, including home accidents, by cause, on a nation-wide scale—revealed a consistent increase in home accident frequencies as rental or value of dwelling units decreased, and as family incomes decreased (*1*, *2*). The correlation held true for all age groups and for both sexes. Assuming that family income and property value or rent are indicative of housing quality, including hazardous conditions, it can be concluded that the home environment was one factor in the accident frequencies found.

However, we should not overlook the significance of other conditions accompanying the low income status. The association between accidents and dwelling rental or value shown by the youth group (15–24 years) discounts the factor of impaired physical condition of the individual. For those of this group in owned homes and in rented multiple dwellings the accident rate almost doubled as the value reported dropped from $3,000 or more to less than $1,000 and as monthly rental dropped from $30 or more to less than $10; for those in rented single dwellings the excess was over 60 percent. From these findings the correlation between substandard housing and increased accident rates appears to persist in the age group normally expected to be the least affected by physical handicap.

Another oft-quoted study of nonfatal home accidents is the Cook County Survey of 4,602 cases treated at the Cook County Hospital (*3*). The analysis of reports of cause revealed that mechanical factors were involved in 64 percent of the cases. The frequent combination of causative factors is illustrated by the finding that in 68 percent of the cases, personal factors were reported as contributing to the accidents. The report concludes ". . . there were few cases that did not have either a definite personal or mechanical factor, and most of them had both."

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Several other home accident surveys have been reported, but they have been limited for the most part to fatalities, which are heavily weighted in the age groups under 5 and over 65 years. The Cincinnati study of fatal accidents in 1947 is one such case (*4*). The health department, safety council, and Public Health Federation collaborated in seeking supplemental data on a selected portion of the 316 accidental deaths. The principal type of accidents, by location, were home accidents, with 132 deaths or 42 percent of the total.

Analyses of fatal home accidents disclosed that the death rate for recognized substandard housing areas was approximately twice (41.4 per annum) that of the rest of the city, (21.2) and a similar relationship prevailed between the lowest economic group and the higher economic groups (40.7 for lowest, 22.5 for middle and 21.4 for highest).

Fatal falls, constituting 47 percent of all fatal accidents, were selected for follow-up nursing visits. From information collected in this fashion it was reported that mechanical or other external factors were involved in 39 of 102 cases, and that illness or disability was present or preceded the fall in 77 cases.

The final conclusion related in the report of this study states: "Educational programs which emphasize only caution and external hazards fail to reach the root of the problem which is primarily a problem of disease rather than a problem of accident." Again it must be remembered that the subject cases did not constitute a representative sample of all home accident cases.

Still another illustration of the disparity of findings and conclusions based on the admittedly inadequate studies of the home accident problem is found in a vague reference in a recent news article to a "research bureau's survey." This report states that "only 17 percent of accidents are the fault of mechanical defects" (*5*). The account further quotes Dr. H. Flanders Dunbar, of New York's Presbyterian Hospital, as saying that accident-prone individuals are responsible for 80 percent of all accidents that occur in the United States. A number of studies of occupational and traffic accidents have pointed to the high accident frequencies experienced by a small percentage of the total subjects studied, and the term "accident prone" has been applied to such individuals. It is a rational assumption that similar factors influence home accident incidence.

The foregoing examination of accident studies emphasizes the need for more careful objective, comprehensive studies, supported by adequate controls. To encompass the influence of environmental conditions, thorough examination of such conditions is indicated for all dwellings in the control and study groups of the survey. The writer is unaware of any study of this character having been reported. There is some hope, however, that the experimental program currently being inaugurated in Kalamazoo City and County, Mich., will afford opportunity for some pioneering efforts in such studies. It is understood that several other organizations and communities are contemplating similar studies. One intriguing possibility is presented by the housing appraisal activities being undertaken by several city health departments. The scope and nature of these surveys is sufficiently broad to permit the inclusion of rather comprehensive accident surveys without major alteration of technique and procedure.

Consideration of the influence of the home's physical environment on accident frequencies should not be confined to such accidents classified as being caused solely by mechanical factors. The principal criticism of home accident studies is the lack of objective consideration of *all* possible causative factors. It should be clear by now that an overwhelming majority of all home accidents are the result of combinations of conditions and circumstances. Does it not follow that the correction of unsafe conditions would reduce accident frequencies to a greater extent than might be anticipated on the basis of those accidents caused solely by hazardous conditions? Similarly, an educational program of accident prevention should effectively negate in considerable measure the potential effect of unsafe conditions, as well as influence personal behavior.

It is pertinent to contemplate for comparative purposes the role of environmental factors in other fields of accident prevention and related activities. Occupational safety programs have since their inception emphasized the elimination and safeguarding of mechanical and physical hazards.

Educational activities directed at the worker's habits have become increasingly popular to supplement the achievements gained by environmental controls. Without attempting to evaluate the relative effectiveness of these techniques, their combined accomplishment is noteworthy. The accident rate based on exposure, among the industries reporting to the National Safety Council has been reduced approximately 50 percent during the past 15 years (*6*).

Motor vehicle accidents, which constitute a problem replete with obstacles and varied implications, have likewise been subject to preventive measures combining environmental and educational tactics. Engineering skills have been applied to devise safety improvements in the vehicle and the highway. Education and legislation have been employed to effect a reduction of unsafe acts: The results reported by the National Safety Council indicate a reduction in rates based on mileage, of 35 percent in 16 years (*6*).

In one major category of home accidents, dwelling fires, a number of cities have reported significant reductions accomplished by annual inspection of dwellings by fire department personnel (*7*). Typical of this type of program is that of the Cincinnati, Ohio, Fire Department (8). The practice of annual dwelling inspections for fire hazards was inaugurated in 1934. The average annual number of dwelling fires for the 6 years preceding the adoption of this program was 995, and for the succeeding 6 years the average was 500, a reduction of 50 percent. The average number of dwelling inspections per year for the same periods was increased from 9,015 to 73,740. Thus we might say that 64,000 additional inspections prevented 500 fires—or for each 128 inspections one fire was prevented.

This program is continuing, and despite the increase in number of dwellings, the number of dwelling fires for the period 1943–47 averaged 540 per year. A further indication of accomplishment is noted in the reduction of fire hazards found—43 percent less in 1947 than in 1943 despite a more complete coverage by inspection. There were 42 percent more inspections in 1947, compared to 1943. It is unfortunate that records were not maintained of persons injured in dwelling fires. The thoroughgoing inspection program has served as the spearhead for a continuous program of community education, including all of the recognized techniques of such activity. Legislation and enforcement has also been employed, but in a minor role. A total of five violations required court action during this 5-year period.

Having examined the available information as represented by the studies previously discussed, and having considered the accomplishments of established programs of accident prevention, we are confronted with the question of planning and developing program activities for the prevention of home accidents. The home's physical environment is so fundamental in the entire problem that any conceivable program must revolve around it. In its broad material sense, home environment includes not only the dwelling structural soundness, its furnishings and equipment, but the design, arrangement, storage facilities, functional suitability, housekeeping and maintenance, and similar factors. Particular safeguards are needed for young children, the aged, and infirm occupants. Overcrowding is a vital factor. The extent to which emphasis may be given to environmental controls may vary with questions of personnel, extent of entire safety program, and other factors. There is evidence that a program of routine dwelling inspections by health department personnel would be justified, assuming an adequate educational program would be integrated with it. Enforcement practices should probably be minimized, but regulations would undoubtedly prove practicable for new construction, remodelling, installation of major equipment, and so forth.

In conclusion, it is emphasized that any consideration of the home accident problem, whether concerned with field studies, research, or prevention programs must give due attention to the environmental conditions. The health department engineering personnel are admirably fitted to supply this necessary balance in cooperation with the medical, nursing, statistical, educational, and other personnel, in the same manner in which such joint efforts have proved effective in many other public health programs. The activities proposed by the American Public Health Association Subcommittee on Accident Prevention illustrate the conviction that home safety programs require the combined competencies and efforts of the entire professional team in the health department (*9*). Staff in-service training is essential to provide all professional groups with an adequate appreciation of the environmental association with home accidents. The more readily we accept the premise that accident rates will succumb to a program combining the correction of unsafe conditions with education stressing the reduction of unsafe acts, the more logical and sound will be our program planning. Then it becomes a question of demonstration and evaluation, to adapt the established public health methods and techniques, as indicated upon closer acquaintance with the problem.

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(*7*) Blake, M. S.: Dwelling inspection by fire departments. Quarterly, April 1936.

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(*9*) American Public Health Association, Subcommittee on Accident Prevention: Accident prevention—an essential public health service. Am. J. Pub. Health **35**: 216–220 (1945).

Accident Facts From Accident Fatalities

By Evelyn H. Halpin, Ph. D.*

The Public Health Service is proposing a program for the collection of supplemental information on fatal accidents. The starting point in this accident fact-finding program is the death certificate filed in the vital statistics offices of the State health department. For each accident fatality reported on a death certificate, a follow-back will be made through local health departments using a special accident fatality report form to obtain information on the cause and circumstances of the accident.

It is recognized that the proposed program is but a limited approach to the solution of the total accident problem because it deals only with fatal accidents. Most accidental injuries do not result in death, but those that do are obviously of a serious nature. Despite the limitations of mortality statistics, they provide useful information on accidents. Accident deaths are discrete events which may be counted readily and are not subject to the difficulties of definition encountered in the enumeration and description of nonfatal injuries. Supplemental accident facts obtainable from a follow-back procedure described briefly here will immediately make available certain basic information needed for formulating accident-prevention programs.

The information for the supplemental accident reports will be obtained by local health department personnel through interviews, usually with the informant named on the death certificate who presumably has knowledge of the facts surrounding the death. Such a procedure has been in operation in Nassau County, N. Y., under the leadership of Dr. Earle G. Brown. In those instances where branches of the State or local government other than the health department have the function of investigating accidental deaths, the health department may obtain the accident facts directly from those sources rather than from the informant named on the death certificate. An arrangement by which traffic and health authorities cooperate to combine facts on motor-vehicle accident fatalities is already in existence in each State. Consequently the program now proposed will include only accident fatalities other than those in which motor vehicles are involved. In areas without full-time local health departments, the State vital statistics offices may collect information on the circumstances of fatal nonmotor vehicle accidents by mail. The collection of accident reports by mail has been practiced successfully by the Kansas State Department of Health for over 15 years.

A copy of a report on each accidental death thus collected will be retained by the local health department for its use, and duplicates will be sent to the State health departments for compilation of State-wide information by the vital statistics offices. The way in which local health departments can utilize such reports and develop prevention programs has been described in a report of the Subcommittee on Accident Prevention of the American Public Health Association.[1]

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Although accidents rank fourth in the list of principal causes of death, the investigation of accident fatalities is not expected to impose a very heavy load on any one local health department. The probable work load may be estimated in advance from a count of accidental deaths, excluding motor-vehicle fatalities, which occurred in any recent year.

Interrelated accident facts tabulated according to a uniform design by the participating States will be consolidated by the National Office of Vital Statistics of the Public Health Service for national use. In addition to publishing national data on accident fatalities, the Public Health Service will assist by providing uniform report forms, procedural manuals, consultation services, and other aids. Also, in cooperation with organizations such as the Home Safety Conference and the National Safety Council, the Public Health Service will carry on activities to develop uniform definitions and other tools which are necessary for obtaining comparable statistics.

The Conference of State and Territorial Health Officers has on several occasions acknowledged the need for health department participation in accident prevention programs, particularly for home accidents, because of the importance of accidents as a cause of disability and death. The proposed program is one step in carrying out the recommendation made at the forty-sixth annual meeting of the conference that the Public Health Service "collect factual data upon which detailed action programs can be promulgated through the State health authorities."

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[1] D. B. Armstrong, M. D., Chairman, Subcommittee on Accident Prevention, American Public Health Association: Accident prevention—an essential public health service. Suggested home safety activities Am. J. Pub. Health 35: 216-220 (1945)

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 5, 1949

Summary

A total of 27,727 cases of measles was reported for the week (last week 24,133, 5-year median 18,962), a seasonal rise of 15 percent, as compared with 22 percent last week and 26 percent (to a total of 34,238) in the corresponding week of 1944. Decreases were reported in the South Atlantic and Mountain areas. States reporting the largest increases are Kansas (from 902 cases to 1,414), California (1,100 to 1,559), Massachusetts (1,224 to 1,658), and New York (1,620 to 2,042). Virginia reported a decline from 1,388 last week to 615 for the current week. The total for the year to date is 161,230, 5-year (1944–48) median 93,989.

Of the total of 4,609 cases of influenza, Texas reported 2,266, South Carolina 736, and Virginia 367. The total to date is 41,359, 5-year median 99,620.

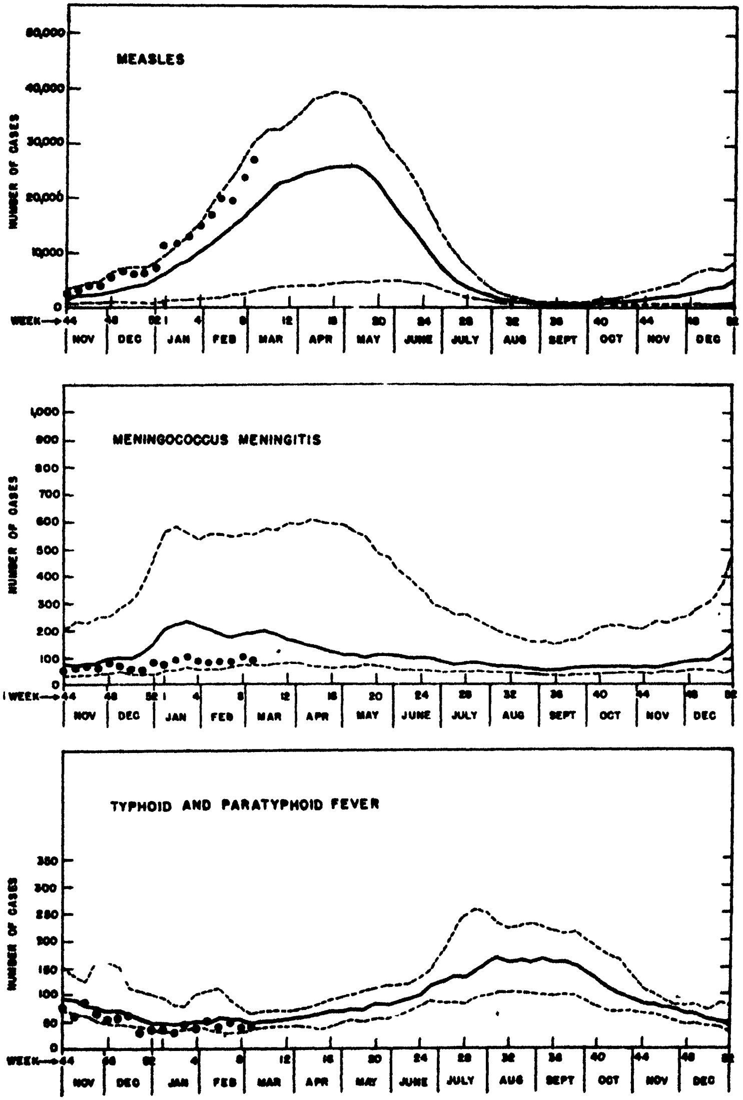
Of 48 cases of poliomyelitis (last week 57, 5-year median 26), 7 occurred in California (last week 14) and 5 each in New Jersey and Texas. No other State reported more than 3 cases. Of the total of 808 cases reported for the year to date (same period last year 292, 5-year median 340), no State has reported more than 26 cases except California (265), Texas (70), Washington (38), Minnesota (36), and New Jersey (31).

During the week 4 cases of smallpox were reported, 2 in Idaho and 1 each in South Dakota and Kentucky. Maryland and Tennessee each reported 1 case of Rocky Mountain spotted fever, bringing the total for the year to date to 12, as compared with 5 for the same period last year and a 5-year median of 4.

Deaths recorded during the week in 94 large cities in the United States totaled 9,801, as compared with 9,419 last week, 9,832 and 10,235, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 9,929. The total for the year to date is 89,048, same period last year 93,534. Infant deaths during the week totaled 634, last week 649, 3-year median 671. The cumulative figure is 6,043, same period last year, 6,400.

Communicable Disease Charts

All reporting States, November 1948 through March 5, 1949



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is a median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

Telegraphic case reports from State health officers for week ended March 5, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [1]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	----	----	654	1	23	----	----	10	----	----	----	6	----
New Hampshire	----	----	4	26	1	1	----	----	4	----	----	----	2	----
Vermont	----	----	----	405	----	----	----	----	6	----	----	----	2	----
Massachusetts	7	----	----	1,658	1	----	----	----	308	----	----	----	52	----
Rhode Island	----	----	----	534	----	12	----	----	9	----	----	----	9	----
Connecticut	1	----	14	532	2	83	----	----	44	----	----	----	12	----
MIDDLE ATLANTIC														
New York	9	1	[2] 4	2,042	8	394	3	----	[3] 280	----	----	1	153	5
New Jersey	1	----	7	993	5	97	5	----	188	----	----	2	58	3
Pennsylvania	17	----	(2)	2,474	6	----	2	----	242	----	----	----	71	----
EAST NORTH CENTRAL														
Ohio	3	----	2	139	3	57	----	----	330	----	----	2	58	15
Indiana	10	----	36	118	----	32	2	----	93	----	1	1	28	13
Illinois	5	2	13	98	4	149	2	----	194	----	----	3	35	2
Michigan [4]	3	----	7	667	2	40	2	----	409	----	----	----	21	1
Wisconsin	----	----	94	846	2	17	3	----	95	----	----	----	38	1
WEST NORTH CENTRAL														
Minnesota	2	----	----	132	1	6	3	----	72	----	----	----	3	----
Iowa	----	----	----	28	----	2	----	----	23	----	----	----	8	9
Missouri	2	----	5	565	1	45	1	----	59	----	1	1	9	----
North Dakota	1	----	2	56	1	----	1	----	10	----	----	----	17	----
South Dakota	1	----	----	10	----	----	1	----	[3] 4	1	----	----	2	----
Nebraska	1	----	2	82	----	----	----	----	13	----	----	----	4	----
Kansas	1	----	2	1,414	----	16	----	----	44	----	----	----	2	----
SOUTH ATLANTIC														
Delaware	4	----	----	21	----	----	----	----	11	----	----	----	----	----
Maryland [4]	----	----	6	1,582	1	70	2	1	[3] 48	----	----	1	12	----
District of Columbia	2	----	----	49	----	6	----	----	8	----	----	----	3	----
Virginia	1	1	367	615	1	106	----	----	11	----	----	3	18	2
West Virginia	3	----	69	181	1	16	----	----	26	----	----	2	19	----
North Carolina	4	----	----	598	3	----	----	----	16	----	2	----	26	----
South Carolina	8	----	736	241	3	211	----	----	12	----	1	2	41	3
Georgia	1	----	20	481	3	28	1	----	12	----	9	4	1	9
Florida	4	----	----	235	----	10	1	----	11	----	1	2	5	----

EAST SOUTH CENTRAL														
Kentucky	6		20	729	7	47			56	1			36	14
Tennessee	1		124	314	3	102		1	37		1	2	15	
Alabama	7		148	611	1	102	1		23				8	6
Mississippi [4]	4		36	106	2	42	1		2		4	5	5	
WEST SOUTH CENTRAL														
Arkansas	1		180	692	1	92	1		6		2	2	16	
Louisiana	3		4	50	3	20	1		1				1	1
Oklahoma	4		73	311	1	80	1		9		1	1	4	4
Texas	18		2,266	3,909	8	604	5		34		2	4	102	26
MOUNTAIN														
Montana	2		4	34					13					
Idaho			11	68		17			[3] 19	2			3	
Wyoming	1			23		8			11					
Colorado			24	375	1				14			1	2	
New Mexico	2		3	217		30			9					
Arizona	4		175	147		51	1		5				21	
Utah [4]				91		5			6				28	
Nevada				2					1					
PACIFIC														
Washington	1		93	469	6	4	1		70				18	
Oregon			38	544		37			21				12	
California	3		20	1,559	6	25	7		[3] 35			1	15	1
Total	144	4	4,609	27,727	89	2,687	48	2	2,964	4	25	40	1,001	
Median, 1944-48	253	10	5,337	18,962	202		26		3,948	5	12	47	2,142	
Year to date 9 weeks	1,635	63	41,359	161,230	798	22,069	808	12	25,109	12	282	363	9,437	
Median, 1944-48	2,724	66	99,620	93,989	1,845		340	4	25,330	63	189	394	20,136	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week	6,749		77,629	213,623	1,642		28,135		47,807	27		3,482	19,470	
Median, 1943-48	10,290		143,178	120,113	3,349		13,743		66,901	139		4,618	45,174	

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[1] Including paratyphoid fever; reported separately, as follows: New Jersey 1; Salmonella infections, not included, New York, 1 case.
[2] New York City and Philadelphia only, respectively.
[3] Including cases reported as streptococcal infection and septic sore thro .
[4] Period ended earlier than Saturday.

Alaska: Influenza 4; measles, 13; pneumonia, 1; scarlet fever, 1; streptococcal sore throat, 1.
Territory of Hawaii: Influenza, 120; measles, 264; poliomyelitis, 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 19, 1949.—During the week ended February 19, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		22	3	265	771	34	27	68	201	1 391
Diphtheria				17	1	4		6	2	30
Dysentery, bacillary				1						1
German measles				140	9		16	9	21	195
Influenza		43			18	4				65
Measles		351	13	374	236	187	94	310	164	1 729
Meningitis					2					2
Mumps		54	3	220	364	27	14	42	174	898
Poliomyelitis						1				1
Scarlet fever		10	1	136	87	5	6	13	14	272
Tuberculosis (all forms)		14	33	82	22	14	4		54	223
Typhoid and paratyphoid fever				10					2	12
Undulant fever					1			1		2
Venereal diseases:										
Gonorrhea		7	5	89	65	26	11	22	57	282
Syphilis		9	6	72	43	11	5	5	14	165
Other forms									1	1
Whooping cough		10		220	15	11	13	2		271

FINLAND

Notifiable diseases—January 1949.—During the month of January 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	7	Poliomyelitis	11
Diphtheria	139	Scarlet fever	321
Dysentery	1	Syphilis	108
Gonorrhea	833	Typhoid fever	23
Paratyphoid fever	91		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

[C indicates cases]

NOTE—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January-December 1948 (includes week ended Jan. 1, 1949)	January 1949	February 1949—week ended— 5	12	19	26
AFRICA						
Egypt	1					
Cairo	1					
ASIA						
Burma	46					
Akyab	5					
Bassein	1					
Moulmein	1					
Rangoon	[illegible]					
China						
Hupeh Province	3					
Wuchang	3					
Kiangsi Province	10					
Kiangsu Province	2					
Shanghai	1					
India	1[illegible]8,10[illegible]	11,116	3,132	141	108	
Ahmadabad						
Allahabad	26					
Alleppey	1					
Bombay	[2] 4[illegible]				1	
Calcutta	[2] 7,[illegible]8	638	204	13	106	
Cawnpore	1					
Cocanada	1					
Colachel	1					
Cuddalore	36	1				
Jodhpur	[2] 6					
Kilakarai	21					
Lucknow	18					
Madras	1,1[illegible]	[illegible]				
Masulipatam	33					
Nagpur	4					
Negapatam	1[illegible]	[illegible]	1	4	1	
New Delhi	26					
Raj Samand	6					
Tuticorin	16	11	1			
Vizagapatam	1					
India (French)						
Chandernagor	21					
Karikal	30[illegible]	1[illegible]		[3] [illegible]		
Pondicherry	411	49		[3] 1		
Yanaon	2					
India (Portuguese)	29					
Indochina (French)						
Annam	[4] 49					
Cambodia	1,[illegible]3		3	1	[illegible]	
Cochinchina	97					
Bien Hoa	1					
Chaudoc	2					
Cholon	29					
Giadinh	23					
Longxuyen	7					
Mytho	6					
Rachgia	133					
Saigon	136					
Laos	[5] 32					
Tonkin	20					
Pakistan	44,393	3,883				
Chittagong	[2] 2	3	3	[illegible]		
Karachi	[illegible]					
Lahore	41[illegible]	7	3			
Siam	44					
Syria	3					

---

[1] Suspected.
[2] Includes imported cases.
[3] Jan. 30-Feb. 12, 1949.
[4] Includes suspected cases; also 4 deaths reported as cases in December 1948.
[5] Includes 12 deaths reported as cases in February 1948.

SMALLPOX—Continued

Place	January-December 1948 (Includes week ended Jan. 1, 1949)	January 1949	February 1949—week ended— 5	12	19	26
EUROPE						
France	3					
Germany	3					
Greece	[19] 8					
Italy [17]	11	[26] 2				
Portugal	80					
Spain	19					
Canary Islands	9					
Turkey	48	15	18	20	3	
NORTH AMERICA						
British Honduras [15]	3					
Guatemala	2					
Mexico	980	3				
SOUTH AMERICA						
Argentina	50					
Bolivia	31					
Brazil [15]	753	26	2	8	7	
Chile	8					
Colombia	6,356	227				
Ecuador [15]	3,731	215				
Paraguay [15]	113					
Peru [15]	3,727	93				
Trinidad	[27] 12					
Venezuela [15]	4,888	163				[28] 50

[15] Includes alastrim.
[16] Feb. 11-20, 1949.
[17] Includes imported cases.
[18] Feb. 1 10, 1949.
[19] Imported
[20] In the port of Makalla, Aden Protectorate.
[21] Corrected figure.
[22] Through week ended Dec. 25, 1948.
[23] Jan 10 17, 1949.
[24] Jan 18 Feb 6, 1949.
[25] Includes 1 case reported from Baguio City, Luzon Island.
[26] In Lombardia Province.
[27] Alastrim
[28] Feb. 13-26, 1949.

TYPHUS FEVER [29]

(Cases)

(P=Present)

AFRICA						
Algeria	202	10				
Basutoland	10					
Belgian Congo [30]	248	12				
British East Africa:						
Kenya [30]	71					
Zanzibar	1					
Egypt	825	12	2			
Eritrea	48	9		3		
Ethiopia	201					
French Equatorial Africa	1					
Gambia Bathurst	1					
Gold Coast [30]	10					
Libya [30]	501	14		4	1	
Madagascar: Tananarive [31]	7					
Morocco (French)	82	5		[32] 1		
Morocco (International Zone)	5					
Morocco (Spanish) [30]	8					
Mozambique [30]	3					
Nigeria [30]	7					
Rhodesia (Southern)	[31] 1					
Senegal	[31] 4					
Sierra Leone	[31] 18					
Somalia	2					
Tunisia [30]	633	4		[33] 1		
Union of South Africa [30]	430	5	1	2		

See footnotes at end of table

Place	January-December 1948 (includes week ended Jan 1 1949)	January 1949	February 1949 week ended—			
			5	12	19	26
ASIA						
Burma	[illegible]					
China [30]	[33] 194					
India	3	2	1			
India (Portuguese)	11	1				
Indochina (French) [30]	73					
Iran [30]	150	8				
Iraq [30]	222	2	2		2	
Japan	[34] 488	32				
Java	3					
Korea		23				
Malay States (Federated)	[31] 14					
Manchuria	48					
Pakistan	22		6			
Palestine [30]	1					[34] 100
Philippine Islands [30]	[36] 5		1			
Straits Settlements Singapore [30]	[33, 37] 20					
Syria [30]	66					
Transjordan	70	4	1			
Turkey (see Turkey in Europe)						
EUROPE						
Albania	15					
Bulgaria	781	31				
Czechoslovakia	9	1				
France	[illegible]					[illegible]
Germany						
British Zone	8					
French Zone	12					
United States Zone	[33] [illegible]					
Great Britain						
Cyprus	[3] 1					
England and Wales	[3] 2					
London	[38] 2					
Ireland (Northern)	[31] [illegible]					
Malta [31]	29		1			
Greece [30, 36]	347	16	3			
Hungary	61	2			3	
Italy [30]	[33] 138					
Sicily	2	7				
Netherlands	[3] 1					
Poland	40	21				
Portugal	[33] 8					
Azores Ponta Delgada	[39] 3					
Madeira Islands Funchal	1					
Rumania [30]	22 211	147	27			
Spain	21					
Turkey	391	34	5	7	5	5
Yugoslavia [30]	633	20				
NORTH AMERICA						
Costa Rica [31]	35	3	1			3
Cuba [31]	24					
Guatemala	161					
Jamaica [3]	20		1			
Mexico [30]	1 128	11	2	5		2
Panama Canal Zone [30]	13					
Panama Republic	7					
Puerto Rico [31]	38		1			1
SOUTH AMERICA						
Argentina	21					
Bolivia	[40] 93					
Brazil	[30, 33] 14					
Chile [30]	609	5				
Colombia [30]	3 234	256				
Curacao [31]	21					
Ecuador [30]	446	35				
Peru	1 257	1				
Venezuela [30]	180	1	1			2

See footnotes at end of table

TYPHUS FEVER—Continued

Place	January-December 1948 (includes week ended Jan. 1, 1949)	January 1949	February 1949—week ended— 5	12	19	26
OCEANIA						
Australia [31]	173	10	1			
Hawaii Territory [31]	22	3				
Honolulu	3					
New Caledonia	1					

---

[29] Reports from some areas are probably murine type, while others include both murine and louse-borne types.
[30] Includes murine type.
[31] Murine type.
[32] Feb. 1-10, 1949.
[33] Corrected figure.
[34] Through week ended Dec. 25, 1948.
[35] Outbreak during the month of February 1949.
[36] Includes suspected cases.
[37] Includes nonresident and imported cases.
[38] Imported.
[39] Deaths
[40] Includes 9 deaths reported as cases in Cochabamba Department in March 1948.

YELLOW FEVER

(C—cases, D—deaths)

AFRICA							
Belgian Congo							
Stanleyville Province	D		[41] 4				
Gold Coast:							
Kumasi	D	1					
Accra	D	2					
Ivory Coast							
Gagnoa	D	1					
Sudan (French).							
Sebekoro	D	1					
NORTH AMERICA							
Panama:							
Pacora	C		[42] 8				
SOUTH AMERICA							
Argentina	D	1					
Cerro Azul, Misiones Territory	D	1					
Bolivia [43]							
Brazil	D	3					
Bahia State.							
Ilheus City, Itajupe	D	1					
Ubaitaba County	D	1					
Rio Grande do Sul State:							
Sao Luiz Gonzaga	D	[44] 1					
British Guiana	D	1					
Colombia	D	19					
Antioquia Department:							
Maceo	D	4					
Yolombo	D	1					
Boyaca Department:							
Campohermoso	D	1					
Caldas Department:							
La Dorado	D	1					
Samana	D	1					
La Victoria	D	1					
Cundinamarca Department:							
Medina	D	7					
Intendencia of Meta:							
Cumaral	D	1					
Restrepo	D	1					
San Martin	D	1					

See footnotes at end of table

YELLOW FEVER—Continued

Place		January–December 1948 (includes week ended Jan. 1, 1949)	January 1949	February 1949—week ended			
				5	12	19	26
SOUTH AMERICA—continued							
Peru [45]							
Loreto Department							
Nauta, Loreto Province	D	1					
San Martin Department							
Saposoa, Saposoa Province	D	[46] 1					
Venezuela							
Bolivar State							
Boatanamo, Tumeremo County	D	1					

---

[41] All in Paulis area; dates as follows: Jan. 1, 1949, 2 deaths; Jan. 17, 1 death; Jan. 31, 1 death.

[42] 5 cases confirmed.

[43] Delayed report. During the months of April and May 1947, 5 cases of yellow fever were reported in Bolivia, distributed as follows: Santa Cruz Department: Nuflo de Chavez 1, Concepcion 1, Cercado 1; La Paz Department: Province of Sud Yungas, Chulmani 1; Province of Nor Yungas, Coroico 1.

[44] Suspected.

[45] Delayed report. On July 23, 1948, 1 death from yellow fever was reported to have occurred in Tingo Maria, Huanuco Department, Peru, in the month of November 1947.

[46] On July 11, 1948.

DEATHS DURING WEEK ENDED FEB. 26, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Feb. 26, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,419	9,811
Median for 3 prior years	10,200	
Total deaths, first 8 weeks of year	79,247	83,702
Deaths under 1 year of age	619	604
Median for 3 prior years	621	
Deaths under 1 year of age, first 8 weeks of year	5,408	5,725
Data from industrial insurance companies:		
Policies in force	70,[illegible] 198	66,855,148
Number of death claims	10,578	10,696
Death claims per 1,000 policies in force, annual rate	7.8	8.4
Death claims per 1,000 policies, first 8 weeks of year, annual rate	9.6	10.5

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Public Health Reports

VOLUME 64 **APRIL 1, 1949** NUMBER 13

TUBERCULOSIS CONTROL ISSUE NO. 38

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Division of Public Health Methods
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Public Health Reports

Vol. 64 • APRIL 1, 1949 • *No. 13*

— Editorial —

Tuberculosis Mortality in Older Age Groups

Mortality statistics compiled for 1947 show that tuberculosis death rates have again declined in the United States. In 1947 the rate was 33.5 per 100,000 as compared to 36.4 in 1946. These figures are gratifying, for they show that we are still making progress toward our goal, the disappearance of tuberculosis from the United States.

An analysis of the 1947 mortality data which appear in the following pages of this issue brings out a fact, however, which should provoke thoughtful attention: the proportion of deaths from tuberculosis among people over 45 years of age is steadily increasing.

For many years we have been accustomed to think of tuberculosis as a disease primarily of young adults. The majority of those it killed were between the ages of 15 and 45— people in the prime of life, wage earners, parents of small children, young people just starting their life work. In 1900, for example, 64 percent of all the reported tuberculosis deaths took place in the 15–44 age group. Only 24 percent of those who died were over 45. By 1940 these proportions had changed. The majority of tuberculosis deaths reported, 53 percent, still took place among people between the ages of 15 and 45, but deaths of those 45 and over had risen to 42 percent of the total.

Even more marked is the shift apparent in the 7 years between 1940 and 1947. In 1947, 52 percent of all those who died of tuberculosis were over 45. The number of deaths in the "vulnerable" ages, 15–44, had fallen to 45 percent of the total.

An important factor in this shift has been the fact that mortality rates have declined more slowly in the older age groups than in the younger. The increasing age of the population as a whole further accentuates the degree of change.

This is the thirty-eighth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear in the first week of each month The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D C, for 10 cents a single copy Subscriptions are obtainable at $1 00 per year, $1 25 foreign

The shift toward older ages at death has great significance for tuberculosis case-finding activities. A comprehensive study of the mass X-ray survey made in Muscogee County, Georgia, published in the March 4 issue of this journal, contains one of the few available tabulations of the ages of those X-rayed. It was disappointing to see the percentages of older people who took part in that survey. Although 62 percent of the population of the county in the age group 45–54 were X-rayed—a percentage roughly comparable to those in the younger ages—only 50 percent of those from 55–64 participated, 34 percent of those 65–74 and 17 percent of those over 75.

Obviously there are many reasons why people do not take part in mass surveys. Many of the very old people are not able to be X-rayed because of illness or incapacity. There are many others not so old, however, who fail to be examined because they think tuberculosis is a disease whose threat they have "outgrown." They must be cautioned that those over 45 are definitely subject to tuberculosis just as younger people are.

Control workers should be reminded that older people also form a major source of infection in the population. Special efforts are needed to discover the disease among those over 45 for the protection both of individuals and of the community. It is our responsibility to urge all men and women, young and old, to have periodic X-ray examinations either in mass surveys or as part of their annual physical examination by private physicians. Only by special emphasis and special efforts can all cases of tuberculosis be discovered, isolated, and brought under treatment.

ROBT. J. ANDERSON, *Medical Director,*
Chief, Division of Tuberculosis.

Tuberculosis Mortality in the United States, 1947

By SARA A. LEWIS*

Fewer people died of tuberculosis in the United States in 1947 than in the previous year. Tuberculosis deaths numbered 48,064, a decrease of 2,847, or 6 percent from the number recorded in 1946. The tuberculosis mortality rate in 1947 was 33.5 per 100,000 estimated midyear population, or 8 percent below the rate of 36.4 in 1946.

Early in the war, it was feared that crowded living quarters, long hours of work, and shortages of medical facilities and personnel, would result in increased tuberculosis mortality, and, because of the chronic nature of the disease, there was also the possibility that these conditions would result in a postwar rise in the death rate. However, mortality rates decreased in each year of the war. Moreover, the decline in the rates has continued through the postwar years, and the tuberculosis mortality rate for 1947 was the lowest ever recorded in the United States. An even further reduction in the tuberculosis death rate in 1948 is indicated by the estimated rate of 30.3, based on a 10 percent sample of death certificates.

Trend of the Death Rate

There has been a tremendous reduction in tuberculosis mortality since the turn of the century. In 1900,[1] tuberculosis was the second leading cause of death with a death rate of 194.4 per 100,000 population. By 1947, it had dropped to the seventh rank in the list of leading causes of death, and the death rate of 33.5 was less than one-fifth of that recorded in 1900.

A time series of tuberculosis mortality rates by race and sex from 1910 [1] (the first year for which mortality statistics were tabulated by cause, race, and sex) through 1947 are shown in table 1 and figure 1. As seen in the chart, the tuberculosis mortality rate declined with few interruptions throughout this period. The decline was rather slow in the early years but subsequent to the peak in 1918 (which was associated with the great influenza pandemic), a much more rapid decline in the rate is evident.

The rate of decline was greater for whites than for nonwhites during 1920–41, but since 1941 the rates for nonwhites have been declining somewhat faster. Within each race group, the decline has been more

---

From the National Office of Vital Statistics This is the sixth in a series of reports on tuberculosis mortality in the United States See references *(1)* to *(5)* for preceding papers

*Biostatistician, Public Health Service

[1] The data for 1900 through 1932 are for the expanding area of the Death Registration States Beginning with 1933, the Death Registration Area has included the entire United States

Table 1. *Death rates for tuberculosis (all forms) by race and sex: Death Registration States, 1910–47*

[Rates per 100,000 estimated midyear population in each specified group]

Year	All races			White			Nonwhite		
	Total	Male	Female	Total	Male	Female	Total	Male	Female
1947 [1]	33.5	43.0	24.2	27.1	36.3	18.0	88.0	100 6	76.0
1946 [1]	36.4	46.2	26.9	29.8	39.2	20.6	92.3	106.2	79.2
1945 [1]	40.1	53.0	28.6	32.7	45.1	21.7	102.6	120.9	86.5
1944 [1]	41.3	53.1	30.5	33.7	45.0	23.3	106.2	122.7	91.3
1943 [1]	42.6	52.9	32.6	34.3	44.4	24.7	112.9	126.4	100.0
1942 [1]	43.1	52.3	34.0	34.4	43.3	25.6	118.4	131.4	106.0
1941 [1]	44.5	52.5	36.5	35.4	43.3	27.4	124.2	134.3	114.5
1940 [1]	45.8	54.1	37.5	36.5	44.7	28.2	127.6	138.7	116.9
1939	47.1	54.0	40.1	37.7	44.7	30.6	129.1	137.3	121.1
1938	49.1	56.0	42.1	39.1	46.2	31.9	136.8	144.0	129.8
1937	53.8	61.3	46.2	43.4	50.9	35.8	145.0	155.0	135.2
1936	55.9	63.4	48.2	45.0	52.2	37.6	151.6	163.9	139.6
1935	55.1	62.1	47.9	44.9	51.7	37.8	145.1	155.4	135.0
1934	56.7	63.1	50.1	46.2	52.7	39.6	148.8	156.9	140.8
1933	59.6	65.4	53.7	48.5	54.3	42.6	157.7	165.6	149.9
1932	62.5	68.0	56.8	50.2	55.9	44.4	173.5	179.5	167.5
1931	67.8	73.5	62.0	54.2	60.1	48.2	191.1	197.4	184.9
1930	71.1	76.2	65.9	57.7	63.4	51.9	192.0	194.3	189.8
1929	75.3	79.3	71.3	62.4	67.1	57.6	192.0	191.5	192.6
1928	78.3	82.5	74.1	64.9	69.7	59.9	199.5	199.4	199.6
1927	79.6	82.9	76.1	66.5	70.7	62.2	208.7	205.4	212.1
1926	85.5	89.1	81.7	72.0	76.4	67.5	223.8	221.5	226.1
1925	84.8	88.0	81.4	71.6	75.8	67.2	221.3	215.8	226.7
1924	87.9	91.5	84.3	74.9	79.3	70.4	218.6	215.0	222.3
1923	91.7	95.4	87.9	79.5	84.4	74.5	213.1	206.3	220.0
1922	95.3	99.5	91.0	82.6	87.5	77.4	218.9	216.6	221.2
1921	97.6	101.1	94.1	84.7	89.1	80.2	239.3	233.7	245.1
1920	113.1	116.6	109.5	99.5	104.1	94.8	262.4	255.4	269.6
1919	125.6	134.2	116.9	110.9	121.1	100.4	284.0	275.5	292.7
1918	149.8	167.7	131.8	134.3	153.2	115.4	346.0	351.0	340.9
1917	143.5	158.7	127.7	129.6	-------	-------	332.6	-------	-------
1916	138.4	152.9	123.3	125.7	141.3	109.5	322.7	322.3	323.0
1915	140.1	155.9	123 5	128.5	144.0	112.2	401.1	420.2	380.5
1914	141.7	158.5	123.9	130.3	146.9	112.9	396.7	417.8	374.0
1913	143.5	158.7	127.4	132.6	147.7	116.7	386.5	401.9	369.9
1912	145.4	159.3	130.7	136.0	149.4	121.8	429.0	459.9	394.5
1911	155.1	168.2	141.3	145.0	157.5	131.9	461.4	484.8	435.2
1910	153.8	167.1	139.8	145.9	158.2	132.8	445.5	479.3	406.8

[1] Excludes deaths among armed forces overseas. Rates based on population excluding armed forces overseas.

rapid for females than for males, particularly in recent years. This difference between the sexes in the rate of decline has been more marked among whites than among nonwhites. White females showed the greatest improvement, and the rate for this group dropped 86 percent between 1910 and 1947. For white males the decrease in rate between these years was 77 percent. Furthermore, the rate for white males levelled off between 1938 and 1942 and increases occurred between 1942 and 1945.[2] The decreases in the death rates from 1910 to 1947 for the two sex groups in the nonwhite population were quite similar, 79 percent for nonwhite males and 81 percent for nonwhite females.

---

[2] These increases in the rate for white males do not seem to indicate a true increase in tuberculosis mortality. They appear to have resulted from the fact that the populations for which the rates were computed excluded the predominantly healthy group serving in the armed forces overseas. For further data on this point, see the previous reports in this series.

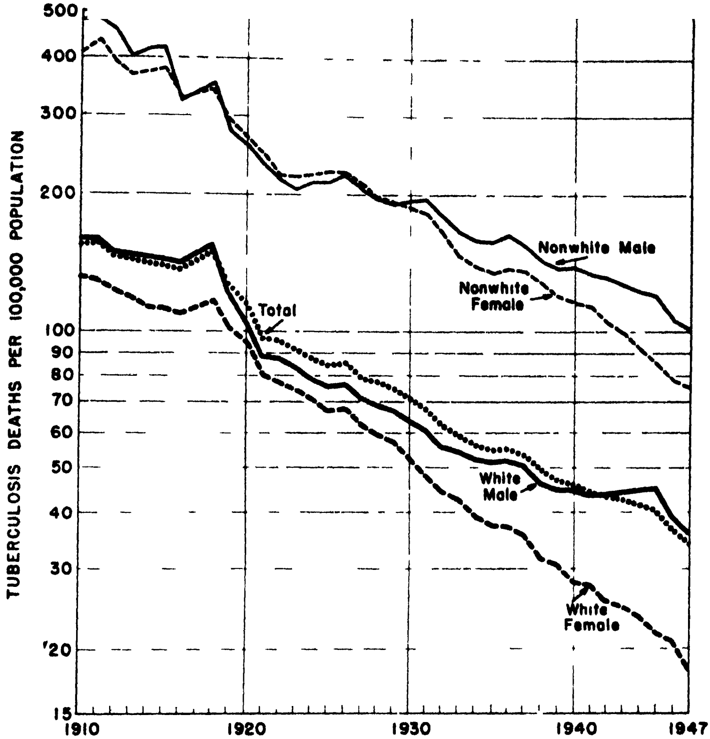

Figure 1. Death rates for tuberculosis (all forms), by race and sex. Death registration, States, 1910-47.

Respiratory and Nonrespiratory Tuberculosis

Of the total number of tuberculosis deaths registered during 1947, 44,462 or 92.5 percent were attributed to respiratory tuberculosis, and 3,602 or 7.5 percent to the nonrespiratory forms of the disease (table 2). The death rate for respiratory tuberculosis alone was 31.0 per 100,000 population, while the rate for all other forms was 2.5 For both respiratory and nonrespiratory infections, similar relationships are maintained for the race-sex groups, the mortality being higher among males than among females and among nonwhites than among whites.

The relative difference in the rates by sex is considerably greater for respiratory than for nonrespiratory forms of the disease. The respiratory tuberculosis death rate for males in 1947 was 40.1, or 82 percent greater than the rate of 22.0 for females. For nonrespiratory tuberculosis, the death rate for males was 2.8 as compared with 2.2 for females, a difference of 27 percent.

Table 2. *Number of deaths and death rates for tuberculosis of the respiratory system and for other forms, by race and sex, United States, 1947*

[Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group excluding armed forces overseas]

Race and sex	Respiratory tuberculosis		Nonrespiratory tuberculosis	
	Number	Rate	Number	Rate
All races	44 462	31.0	3 602	2.5
Male	28 558	40.1	2 027	2.8
Female	15 904	22.0	1 575	2.2
White	32 504	25.3	2 279	1.8
Male	21 871	34.3	1 296	2.0
Female	10 633	16.5	983	1.5
Nonwhite	11 958	79.3	1 323	8.8
Male	6 687	90.7	731	9.9
Female	5 271	68.3	592	7.7

While the frequency of deaths from nonrespiratory tuberculosis has reached a very low level among whites, it is still of substantial importance in the nonwhite population. In 1947, the death rate for nonrespiratory tuberculosis was 1.8 per 100,000 population for whites, whereas the rate for nonwhites was 8.8, or almost 5 times as large. This race differential is much greater than that seen for respiratory tuberculosis. The respiratory tuberculosis death rate for nonwhites in 1947 was 79.3 or a little over 3 times the rate of 25.3 for whites.

Of the deaths in 1947 from nonrespiratory tuberculosis, 28.2 percent were caused by disseminated tuberculosis and 27.1 percent by tuberculosis of the meninges and central nervous system (table 3). An additional third (35.2 percent) resulted from tuberculosis of the intestines and peritoneum, of the vertebral column, and of the genito-urinary system.

In interpreting these figures it is important to note that they represent only a part of the total number of cases in which non-

Table 3. *Number of deaths and death rates for tuberculosis, by specified form, United States, 1947*

[Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population excluding armed forces overseas]

Form	Number of deaths	Percent of total	Death rate
Tuberculosis (all forms)	48 064	100.0	33.5
Tuberculosis of the respiratory system	44 462	92.5	31.0
Tuberculosis (other forms)	3 602	7.5	2.5
Tuberculosis of the meninges and central nervous system	97[illegible]	2.0	.7
Tuberculosis of the intestines and peritoneum	478	1.0	.3
Tuberculosis of the vertebral column	433	.9	.3
Tuberculosis of the bones and joints (except vertebral column)	153	.3	.1
Tuberculosis of the skin and subcutaneous cellular tissue	18	0.0	0.0
Tuberculosis of the lymphatic system (except bronchial, mediastinal, mesenteric, and retroperitoneal lymph nodes)	75	.2	.1
Tuberculosis of the genito-urinary system	358	.7	.2
Tuberculosis of other organs	93	.2	.1
Disseminated tuberculosis	1 017	2.1	.7

respiratory involvement is mentioned on the death certificate. When respiratory and nonrespiratory forms of tuberculosis are jointly reported, respiratory tuberculosis is chosen as the primary cause for statistical classification. The effects of this classification procedure are shown by cross-tabulation of the regularly published primary cause data by secondary cause of death. Such a tabulation is available for 1940 and the data on nonrespiratory tuberculosis are summarized in table 4. Column 1 shows the number of deaths from tuberculosis in that year for which no respiratory infection was reported. Column 2 shows the numbers of cases in which a nonrespiratory condition appeared on the death certificate and was classified as secondary to some other form of tuberculosis. The sum of the cases in columns 1 and 2 are shown in column 3.

Table 4. *Number of deaths from nonrespiratory tuberculosis, by specified form: associated cause tabulation United States, 1940*

Form	(1) Primary cause	(2) Secondary to other forms of tuberculosis	(3) Total primary and secondary
Nonrespiratory tuberculosis	4,852	6,428	11,280
Tuberculosis of the meninges and central nervous system	1,310	1,396	2 706
Tuberculosis of the intestines and peritoneum	904	2 741	3,645
Tuberculosis of the vertebral column	596	320	916
Tuberculosis of the bones and joints (except vertebral column)	256	291	547
Tuberculosis of the skin and subcutaneous cellular tissue	15	22	37
Tuberculosis of the lymphatic system (except bronchial, mediastinal, mesenteric, and retroperitoneal lymph nodes)	131	121	252
Tuberculosis of the genito-urinary system	436	592	1,028
Tuberculosis of other organs	117	204	321
Disseminated tuberculosis	1 087	741	1,828

In addition to the 4,852 deaths in 1940 for which nonrespiratory forms of tuberculosis were entered as the primary cause. there were 6,428 cases in which these conditions were listed as contributory to death from respiratory, or another nonrespiratory form of tuberculosis. The bulk of this group, 5,662, was associated with respiratory tuberculosis. The figures for tuberculosis of the intestines and peritoneum are particularly interesting. While 904 deaths were attributed to these forms of the disease as the primary cause, there were 2,715, or over 3 times as many cases, in which intestinal and peritoneal tuberculosis were associated with respiratory tuberculosis. In all, there were 3,645 deaths for which tuberculosis of the intestines and peritoneum were mentioned as either the primary or secondary cause, a number greater than the corresponding total for any of the other nonrespiratory forms. In the tabulation of primary cause alone, however, tuberculosis of the intestines and peritoneum ranked third in frequency among the nonrespiratory forms of the disease.

Mortality by Age, Race, and Sex

The pattern formed by the age-specific tuberculosis mortality rates for the four race-sex groups in 1947 is in general similar to that seen in recent years (figure 2 and table 5). From a relatively low point for children under 5, the rates for all four groups decline to a minimum level for children 5-9 years of age. After this point, the variation in the rates with age becomes very distinct for each of the race-sex groups. The rates for white males rise continuously to a maximum of 106.5 in the age group 65–74. The rates for white females in the younger ages rise more rapidly and are somewhat higher than those for males, but through the adult ages remain fairly level and are lower than those for males. Only in the two oldest age groups does a pronounced increase in the rate for white females again occur.

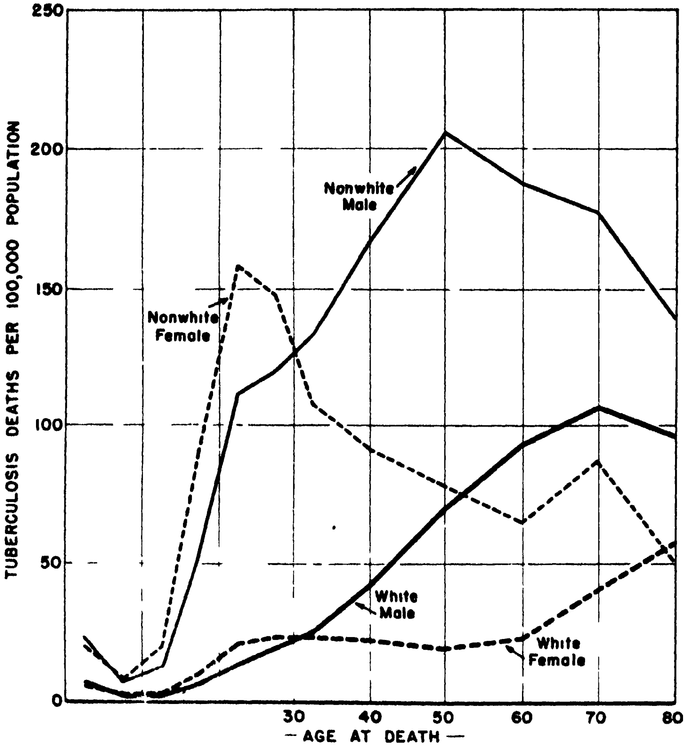

Figure 2. Death rates for tuberculosis (all forms) by age, race and sex: United States, 1947.

Among nonwhite males, the tuberculosis mortality rates rise rapidly during childhood and the young adult years, reaching a peak of 205.2

Table 5. *Number of deaths from tuberculosis (all forms), death rates and percentage changes in rates, by age, race, and sex: United States, 1939–41 average, 1946 and 1947*

[Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated midyear population in each specified group, excluding armed forces overseas]

Race, sex, and year	All ages [1]	Under 5 years	5–9 years	10–14 years	15–19 years	20–24 years	25–29 years	30–34 years	35–44 years	45–54 years	55–64 years	65–74 years	75 years over	Not stated
	NUMBER													
All races, both sexes:														
1947	48,064	1,099	226	373	1,720	3,612	3,896	3,801	8,314	8,865	7,999	5,586	2,544	29
1946	50,911	1,300	313	434	1,946	4,119	4,356	4,408	8,919	9,314	8,133	5,316	2,314	39
1939–41	60,429	1,613	475	799	3,388	5,719	6,236	5,811	10,846	10,373	7,960	5,104	2,052	53
Male:														
1947	30,585	579	107	148	637	1,440	1,685	1,919	5,338	6,845	6,377	3,971	1,522	17
1946	31,886	666	181	174	740	1,620	1,935	2,265	5,699	7,121	6,368	3,715	1,378	24
1939–41	35,433	831	251	306	1,234	2,306	2,782	3,038	6,903	7,650	5,786	3,308	1,109	30
Female:														
1947	17,479	520	119	225	1,083	2,172	2,211	1,882	2,976	2,020	1,622	1,615	1,022	12
1946	19,025	634	132	260	1,206	2,499	2,421	2,143	3,220	2,193	1,765	1,601	935	15
1939–41	24,996	782	224	493	2,154	3,413	3,454	2,773	4,043	2,723	2,174	1,796	943	23
White, both sexes:														
1947	34,783	724	122	150	764	1,795	2,209	2,406	5,778	6,726	6,823	4,947	2,321	18
1946	37,340	842	181	210	909	2,246	2,658	2,872	6,284	7,201	6,999	4,797	2,113	28
1939–41	43,282	1,014	265	372	1,617	3,180	3,828	3,827	7,605	8,183	6,865	4,596	1,904	28
Male:														
1947	23,167	377	57	63	296	717	988	1,206	3,752	5,314	5,491	3,531	1,365	10
1946	24,283	430	106	84	324	872	1,192	1,467	4,057	5,606	5,546	3,342	1,241	16
1939–41	26,350	520	141	152	589	1,239	1,690	2,000	4,848	6,143	5,042	2,955	1,013	19
Female:														
1947	11,616	347	65	87	468	1,078	1,221	1,200	2,026	1,412	1,332	1,416	955	8
1946	13,057	412	75	126	585	1,374	1,466	1,405	2,227	1,595	1,453	1,455	872	12
1939–41	16,932	494	124	220	1,028	1,941	2,138	1,827	2,757	2,040	1,823	1,641	891	9
Nonwhite, both sexes:														
1947	13,281	375	104	223	956	1,817	1,687	1,395	2,536	2,139	1,176	639	223	11
1946	13,571	458	132	224	1,037	1,873	1,698	1,536	2,635	2,113	1,134	519	201	11
1939–41	17,147	599	210	427	1,771	2,539	2,408	1,984	3,241	2,190	1,095	508	148	25
Male:														
1947	7,418	202	50	85	341	723	697	713	1,586	1,531	886	440	157	7
1946	7,603	236	75	90	416	748	743	798	1,642	1,515	822	373	137	8
1939–41	9,083	311	110	154	645	1,067	1,092	1,038	1,955	1,507	744	353	96	11
Female:														
1947	5,863	173	54	138	615	1,094	990	682	950	608	290	199	66	4
1946	5,968	222	57	134	621	1,125	955	738	993	598	312	146	64	3
1939–41	8,064	288	100	273	1,126	1,472	1,316	946	1,286	683	351	155	52	14

See footnote at end of table.

Table 5. *Number of deaths from tuberculosis (all forms), death rates and percentage changes in rates, by age, race, and sex: United States, 1939–41 average, 1946 and 1947*—Continued

Race, sex, and year	All ages [1]	Under 5 years	5–9 years	10–14 years	15–19 years	20–24 years	25–29 years	30–34 years	35–44 years	45–54 years	55–64 years	65–74 years	75 years over	Not stated
	RATE													
All races, both sexes:														
1947	33.5	7.5	1.9	3.5	15.6	30.3	33.3	34.2	41.4	52.8	62.8	76.2	76.5	--------
1946	36.4	9.7	2.7	4.1	17.7	35.5	38.1	40.0	45.1	56.1	65.5	74.0	72.4	--------
1939–41	45.8	15.2	4.4	6.8	27.5	49.2	56.2	56.5	58.9	66.8	74.7	80.4	77.4	--------
Male:														
1947	43.0	7.8	1.7	2.7	11.7	24.7	29.7	35.6	54.0	81.8	99.4	111.5	99.8	--------
1946	46.2	9.7	3.1	3.2	13.9	29.5	35.3	42.5	58.5	85.8	101.5	106.3	93.7	--------
1939–41	53.5	15.4	4.6	5.2	20.0	40.5	51.1	59.7	73.8	96.1	106.1	105.0	89.2	--------
Female:														
1947	24.2	7.3	2.0	4.3	19.5	35.7	36.6	32.8	29.2	24.0	25.6	42.8	56.8	--------
1946	26.9	9.6	2.3	5.0	21.3	40.8	40.7	37.7	32.1	26.4	28.7	43.4	54.3	--------
1939–41	38.0	14.9	4.2	8.6	35.1	57.7	61.1	53.4	43.9	36.0	41.8	56.2	67.0	--------
White, both sexes:														
1947	27.1	5.6	1.2	1.6	7.9	17.0	21.1	24.2	32.0	44.0	57.7	72.2	75.3	--------
1946	29.8	7.2	1.8	2.3	9.4	21.8	26.0	29.2	35.3	47.6	60.8	71.5	71.3	--------
1939–41	36.5	10.9	2.8	3.6	14.8	30.7	38.7	41.4	46.0	57.6	69.4	77.7	76.8	--------
Male:														
1947	36.3	5.7	1.1	1.3	6.2	13.8	19.4	24.9	42.0	69.7	92.4	106.5	96.7	--------
1946	39.2	7.1	2.1	1.8	6.9	17.9	24.2	30.6	46.1	74.1	95.5	102.8	91.0	--------
1939–41	44.2	11.0	3.0	2.9	10.7	24.2	34.6	43.6	58.4	84.3	99.9	101.0	87.2	--------
Female:														
1947	18.0	5.5	1.3	1.9	9.6	20.0	22.7	23.5	22.1	18.5	22.6	40.0	57.3	--------
1946	20.6	7.2	1.5	2.8	11.7	25.3	27.7	27.8	24.8	21.1	25.4	42.0	54.5	--------
1939–41	28.7	10.8	2.7	4.3	18.9	37.0	42.7	39.3	33.5	29.5	37.7	54.9	67.7	--------
Nonwhite, both sexes:														
1947	88.0	21.2	6.4	16.0	71.4	135.0	134.4	119.0	126.6	140.3	127.5	133.4	91.4	--------
1946	92.3	27.7	8.4	16.3	78.1	142.8	138.5	131.8	132.8	142.6	126.7	110.7	87.0	--------
1939–41	126.9	45.1	15.3	30.8	129.2	202.2	201.5	190.8	171.9	167.7	142.5	118.6	85.6	--------
Male:														
1947	100.6	22.9	6.1	12.2	51.9	110.4	118.3	131.8	166.9	205.2	187.3	177.4	138.9	--------
1946	106.2	28.5	9.5	13.1	64.8	120.5	131.0	148.1	173.9	207.0	177.2	154.1	129.2	--------
1939–41	136.7	47.2	16.1	22.3	96.7	182.3	195.4	208.1	213.4	224.7	182.2	158.4	118.8	--------
Female:														
1947	76.0	19.5	6.6	19.7	90.0	158.3	148.9	108.1	90.2	78.0	64.6	86.1	50.4	--------
1946	79.2	26.8	7.3	19.4	90.5	162.8	145.1	117.9	95.4	79.7	72.4	64.6	51.2	--------
1939–41	117.5	43.1	14.5	39.2	160.0	219.6	206.9	174.9	132.7	107.5	97.6	75.5	56.5	--------

	PERCENTAGE CHANGE													
All races, both sexes:														
1946 to 1947	−8.0	−22.7	−29.6	−14.6	−11.9	−14.6	−12.6	−14.5	−8.2	−5.9	−4.1	+3.0	+5.7	....
1939–41 to 1947	−26.9	−50.7	−56.8	−48.5	−43.3	−38.4	−40.7	−39.5	−29.7	−21.0	−15.9	−5.2	−1.2	....
Male:														
1946 to 1947	−6.9	−19.6	−45.2	−15.6	−15.8	−16.3	−15.9	−16.2	−7.7	−4.7	−2.1	+4.9	+6.5	....
1939–41 to 1947	−19.6	−49.9	−63.0	−48.1	−41.5	−39.0	−41.9	−40.4	−26.8	−14.9	−6.3	+6.2	+11.9	....
Female:														
1946 to 1947	−10.0	−24.0	−13.0	−14.0	−8.5	−12.5	−10.1	−13.0	−9.0	−9.1	−10.8	−1.4	+4.6	....
1939–41 to 1947	−36.3	−51.0	−52.4	−50.0	−44.4	−38.1	−40.1	−38.6	−33.5	−33.3	−38.8	−23.8	−15.2	....
White, both sexes:														
1946	−9.1	−22.2	−33.3	−30.4	−16.0	−22.0	−18.8	−17.1	−9.3	−7.6	−5.1	+1.0	+5.6	....
1939–41 to 1947	−25.8	−48.6	−57.1	−55.6	−46.6	−44.6	−45.5	−41.5	−30.4	−23.6	−16.9	−7.1	−2.0	....
Male:														
1946 to 1947	−7.4	−19.7	−47.6	−27.8	−10.1	−22.9	−19.8	−18.6	−8.9	−5.9	−3.2	+3.6	+6.3	....
1939–41 to 1947	−17.9	−48.2	−63.3	−55.2	−42.1	−43.0	−43.9	−42.9	−28.1	−17.3	−7.5	+5.4	+10.9	....
Female:														
1946 to 1947	−12.6	−23.6	−13.3	−32.1	−17.9	−20.9	−18.1	−15.5	−10.9	−12.3	−11.0	−4.8	+5.1	....
1939–41 to 1947	−37.3	−49.1	−51.9	−55.8	−49.2	−45.9	−46.8	−40.2	−34.0	−37.3	−40.1	−27.1	−15.4	....
Nonwhite, both sexes:														
1946 to 1947	−4.7	−23.5	−23.8	−1.8	−8.6	−5.5	−3.0	−9.7	−4.7	−1.6	+.6	+20.5	+5.1	....
1939–41 to 1947	−30.7	−53.0	−58.2	−48.1	−44.7	−33.2	−33.3	−37.6	−26.4	−16.3	−10.5	+12.5	+6.8	....
Male:														
1946 to 1947	−5.3	−19.6	−35.8	−6.9	−19.9	−8.4	−9.7	−11.0	−4.0	−.9	+5.7	+15.1	+7.5	....
1939–41 to 1947	−26.4	−51.5	−62.1	−45.3	−46.3	−39.4	−39.5	−36.7	−21.8	−8.7	+2.8	+12.0	+16.9	....
Female:														
1946 to 1947	−4.0	−27.2	−9.6	+1.5	−.6	−2.8	+2.6	−8.3	−5.5	−2.1	−10.8	+33.3	−1.6	....
1939–41 to 1947	−35.3	−54.8	−54.5	−49.7	−43.7	−27.9	−28.0	−38.2	−32.0	−27.4	−33.8	+14.0	−10.8	....

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[1] Totals for rate and percentage figures include ages not stated.

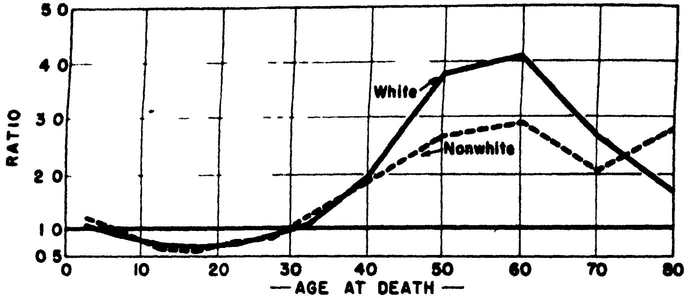

Figure 3. Ratio of tuberculosis death rates for males to death rates for females, by age and race: United States, 1947.

at the age group 45–54. This increase is more rapid between the ages of 10 and 24 than between 25 and 54. After 54, the rates for nonwhite males decrease gradually but remain well above those for the other groups in the population.

For nonwhite females in the age groups between 10 and 24, the rates exhibit a particularly sharp rise to a pronounced peak at 20–24 years, and are substantially higher than those for the other three race-

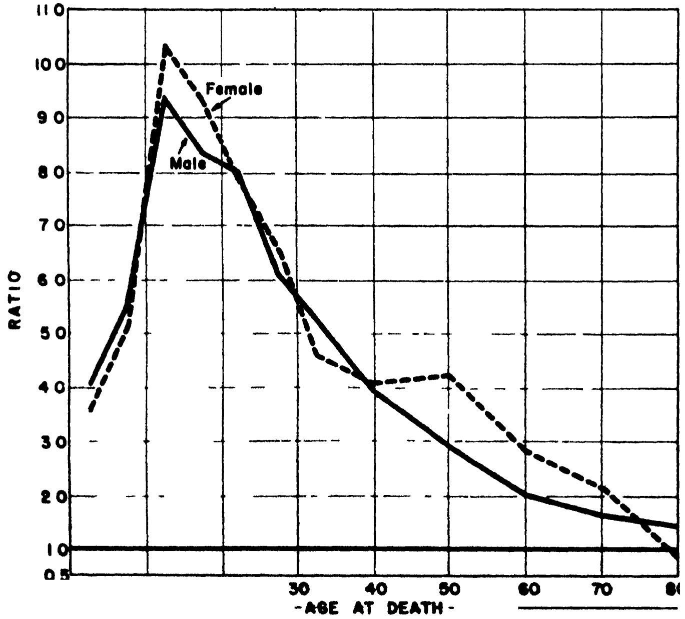

Figure 4. Ratio of tuberculosis death rates for nonwhites to death rates for whites, by age and sex: United States, 1947.

sex groups. Through the subsequent years, a gradual decline occurs which is interrupted once, in the age group 65–74.

While the general relations between the rates by race and sex are reflected by the absolute differences which are shown in figure 2, the relative differences are more easily discerned in the ratios presented in figures 3 and 4 and in table 6. As seen in table 6, the tuberculosis death rates for males in 1947 are lower than those for females in the younger ages (except in the age group under 5), become somewhat higher in the age group 30–34, and then remain at least twice as high.

Table 6. *Ratios of death rates for tuberculosis (all forms) at each age, by race and sex: United States, 1947*

Age at death	Ratio of death rate for males to death rate for females			Ratio of death rate for non-whites to death rate for whites		
	All races	White	Non white	Both sexes	Male	Female
Under 5 years	1.07	1.04	1.17	3.79	4.02	3.55
5–9	.85	.85	.92	5.33	5.55	5.08
10–14	.63	.68	.62	10.00	9.38	10.37
15–19	.60	.65	.58	9.04	8.37	9.38
20–24	.69	.69	.70	7.94	8.00	7.92
25–29	.81	.85	.79	6.37	6.10	6.56
30–34	1.09	1.06	1.22	4.92	5.29	4.60
35–44	1.85	1.90	1.85	3.96	3.97	4.08
45–54	3.41	3.77	2.63	3.19	2.94	4.22
55–64	3.88	4.09	2.90	2.21	2.03	2.86
65–74	2.61	2.66	2.06	1.85	1.67	2.15
75 and over	1.76	1.69	2.76	1.21	1.44	.88

The ratios of the male-to-female rates for whites and nonwhites are very similar in the younger age groups (figure 3). In the age range 45–74 however, the sex differential is considerably greater in the white than in the nonwhite population. For persons 55–64 years, among whom the peak differential occurs, the mortality risk from tuberculosis is four times greater among white males than among white females, and three times greater among nonwhite males than among nonwhite females.

The race differential in tuberculosis mortality is even more striking The 1947 rates for nonwhites are very much higher than those for whites at all ages except 75 years and over (figure 4). The ratios of the tuberculosis mortality rates for nonwhites to those for whites rise from 3.8 in the youngest age group to a very pronounced peak of 10.0 for the age group 10–14. From that point, the differences diminish gradually and are smallest in the oldest age group.

The data in table 5 afford a comparison of tuberculosis mortality in the two postwar years, 1946 and 1947, with the experience for the 3-year period immediately preceding the war. For almost all population groups, substantial decreases are seen. In general, relatively greater gains were made by females than by males, and by younger than by older persons.

The average annual death rate for males for the 1939–41 period was 53.5 as compared with a rate of 43.0 in 1947, a decline of 20 percent. The drop in the corresponding rates for females, from 38.0 to 24.2, was 36 percent, or almost twice as large. Among males, there is a substantial difference between the races in degree of decline—18 percent for whites and 26 percent for nonwhites. Among females, however, the relative decreases for whites and nonwhites were almost the same—37 and 35 percent, respectively.

The tuberculosis mortality rates for all races and both sexes declined in each age group from 1939–41 to 1947. In general, the degree of decrease varied inversely with age, being greatest in the youngest groups and becoming gradually smaller with increasing age. The proportionate changes in the rates between the prewar period and 1947 for the four race-sex groups are depicted in figure 5. From the lower end of the age scale through 34 years no important differences by race or sex appear. In the age groups between 35 and 64 years, however, the decreases become gradually smaller for both white and nonwhite males but are slightly greater for females of both racial groups.

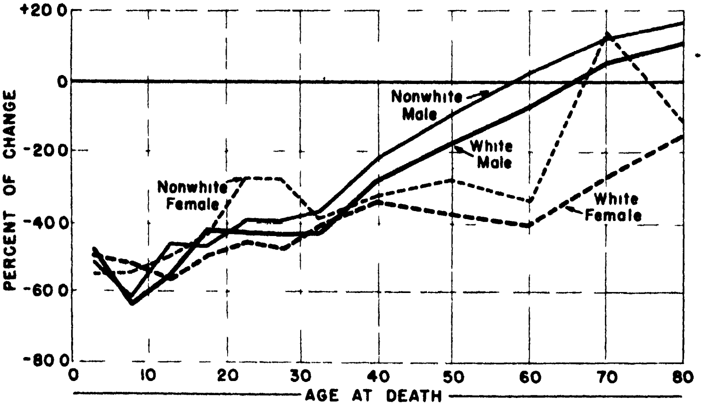

Figure 5. Percentage changes in tuberculosis mortality rates by age, race, and sex, 1939–41 average, 1947.

After age 64, consistent decreases are no longer seen. For white and nonwhite males in the two oldest age groups, and for nonwhite females 65–74 years of age, the 1947 rate exceeded that for the period 1939–41. Only for white females were the rates for 1947 well below those for the earlier period.

In the population groups for which increases have been noted, the differences between the 1947 and the average 1939–41 rates range between 5 and 17 percent. However, the series of annual rates for this period give no clear indication of an upward movement in mortality. For the years 1939 through 1947, the death rates for both white and nonwhite males in the two oldest age groups have remained at a fairly constant level, varying within relatively narrow limits and exhibiting no definite upward or downward movement. The death rate for nonwhite females 65–74 years, while following a highly irregular course (having somewhat the shape of the letter "W") have likewise shown no definite trend.

Death Rates by State

Tuberculosis death rates by State of residence showed wide variation in 1947 (table 7). The lowest rate recorded was 11.8 for residents of Iowa. The highest, 100.0 for Arizona, was over 8 times as great and very much greater than the next highest rate of 60.3 for New Mexico. When the extreme rates are excluded, however, most of the 1947 State rates are fairly similar, and those for almost half (21) of the States fall within the narrow range of 30 to 40 deaths per 100,000 population.

In general, the geographic distribution of tuberculosis mortality rates in 1947 is similar to that for previous years. As seen in figure 6, States in the lower quartile were generally located in the north central and northwestern areas, although Maine and New Hampshire were also in this group. States in the upper quartile formed a solid belt of relatively high tuberculosis mortality along the southernmost part of the country from Arizona on the west to Louisiana and Arkansas on the east, then northeast to Maryland and Delaware on the Atlantic coast.

Crude death rates (i. e., for the total population, are affected by demographic as well as other factors, which must be considered in evaluating the significance of State-to-State variations in the death rates. Such an evaluation is limited at present by the lack of State population statistics by characteristics such as age, race, and sex. Other factors to be considered are State-to-State differences in the accuracy and completeness with which tuberculosis deaths are reported, and certain statistical practices in the reallocation of deaths.

For example, the extremely high rate for Arizona may in large part have been due to the influx to this State of tuberculous patients from other parts of the country. Although deaths of nonresidents are assigned to their usual place of residence, persons who have remained in a State for 1 year or longer are classified as residents. Consequently, many deaths assigned to Arizona would probably have been allocated elsewhere if the patient's home State had been considered his residence.

The death rates for residents of almost all of the States showed a decrease between 1946 and 1947. Many of the decreases were

Table 7. *Number of deaths from tuberculosis (all forms), death rates and percentage changes in rates: United States and each State, 1939–41 average, 1946, and 1947*

[By place of residence. Exclusive of deaths among armed forces overseas. Rates per 100,000 estimated total midyear population present in area]

Area	Number			Rate			Percentage change in rate	
	1947	1946	1939–41 average	1947	1946	1939–41 average [1]	1946 to 1947	1939-41 to 1947
United States	48,064	50,911	60,429	33.5	36.4	45.8	−8.0	−26.9
Alabama	1,147	1,122	1,518	40.5	40.0	53.7	+1.3	−24.6
Arizona	644	727	724	100.0	122.0	141.9	−18.0	−29.5
Arkansas	802	699	1,009	41.9	37.1	51.7	+12.9	−19.0
California	3,455	3,959	3,838	35.2	41.8	54.5	−15.8	−35.4
Colorado	375	401	503	32.8	35.4	44.5	−7.4	−26.3
Connecticut	504	589	616	25.5	30.8	36.1	−17.2	−29.4
Delaware	132	133	152	45.4	47.3	56.7	−4.0	−19.9
District of Columbia	497	488	548	57.7	57.9	78.3	−.3	−26.3
Florida	793	721	944	34.1	32.2	49.0	+5.9	−30.4
Georgia	1,054	1,070	1,510	33.6	34.2	48.0	−1.8	−30.0
Idaho	71	67	99	13.5	12.8	19.0	−5.5	−28.9
Illinois	2,842	3,014	3,663	33.8	37.7	46.5	−10.3	−27.3
Indiana	1,083	1,128	1,398	28.2	30.1	40.6	−6.3	−30.5
Iowa	307	329	450	11.8	12.8	17.8	−7.8	−33.7
Kansas	322	307	423	16.7	16.4	23.4	+1.8	−28.6
Kentucky	1,472	1,602	1,961	52.9	58.4	69.4	−9.4	−23.8
Louisiana	986	1,089	1,347	38.8	43.1	56.4	−10.0	−31.2
Maine	193	216	268	21.8	25.0	31.7	−12.8	−31.2
Maryland	1,172	1,186	1,268	54.8	55.9	68.7	−2.0	−20.2
Massachusetts	1,586	1,664	1,623	34.2	36.9	37.4	−7.3	−8.6
Michigan	1,675	1,891	1,828	27.6	32.2	34.8	−14.3	−20.7
Minnesota	579	585	758	20.0	20.7	27.2	−3.4	−26.5
Mississippi	729	741	1,074	34.8	36.0	48.5	−3.3	−28.2
Missouri	1,291	1,276	1,783	33.1	33.3	46.9	−.6	−29.4
Montana	152	164	235	31.1	34.3	42.3	−9.3	−26.5
Nebraska	199	177	225	15.5	13.8	17.3	+12.3	−10.4
Nevada	44	73	70	31.7	54.9	62.2	−42.3	−49.0
New Hampshire	83	116	133	15.5	22.8	27.1	−32.0	−42.8
New Jersey	1,555	1,647	1,852	33.6	36.5	44.6	−7.9	−24.7
New Mexico	330	388	357	60.3	73.9	67.0	−18.4	−10.0
New York	5,286	5,601	6,244	37.3	40.5	46.5	−7.9	−19.8
North Carolina	1,128	1,182	1,598	30.5	32.2	44.4	−5.3	−31.3
North Dakota	88	96	127	16.3	17.9	20.1	−8.9	−18.9
Ohio	2,377	2,583	2,913	31.0	34.5	42.2	−10.1	−26.5
Oklahoma	701	708	1,104	30.7	30.8	49.3	−.3	−37.7
Oregon	314	311	307	20.3	21.7	27.7	−6.5	−26.7
Pennsylvania	3,467	3,697	4,231	33.0	36.2	42.8	−8.8	−22.9
Rhode Island	233	232	265	31.3	31.3	37.5	0	−16.5
South Carolina	557	562	876	28.5	29.5	45.7	−3.4	−37.6
South Dakota	167	172	197	28.9	31.2	31.2	−7.4	−7.4
Tennessee	1,544	1,631	2,298	50.0	54.3	78.5	−7.9	−36.3
Texas	2,791	2,923	3,814	39.3	42.0	59.1	−6.4	−33.5
Utah	80	83	86	12.5	13.1	15.5	−4.6	−19.4
Vermont	119	129	144	32.5	36.8	40.4	−11.7	−19.6
Virginia	1,244	1,300	1,628	41.5	43.6	59.4	−4.8	−30.1
Washington	592	738	689	25.1	32.2	39.2	−22.0	−36.0
West Virginia	683	718	880	36.3	39.2	46.2	−7.4	−21.4
Wisconsin	585	648	806	18.0	20.5	25.8	−12.2	−30.2
Wyoming	34	28	45	12.8	10.6	17.5	+20.8	−26.9

[1] Based on average 1939–41 population.

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relatively small and probably within the limits of chance variation. Decreases in rate of from 0.3 to 5 percent occurred for 11 States; from 6 to 10 percent for 18 States; from 12 to 15 percent for 4 States;

and 16 percent or greater for 7 States. The largest relative decreases were 22 percent for Washington, 32 percent for New Hampshire, and 42 percent for Nevada.

For two States, Rhode Island, Oklahoma, and for the District of Columbia, the rates were the same in both years or differed by less than 0.5 percent. Of the seven States which showed some increase in rates, only that for Arkansas was statistically significant. The rate rose from 37.1 to 41.9, an increase of 13 percent. However, this rise followed an even sharper decline of 17 percent from 1945 to 1946, and the 1947 rate was lower than that for 1944 (44.8).

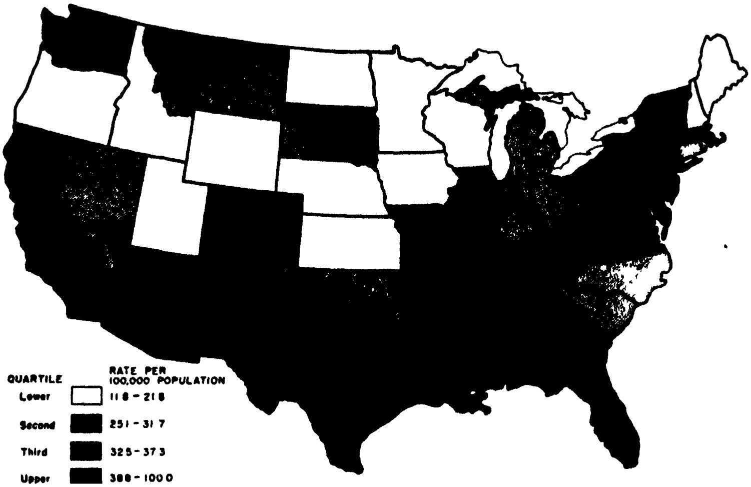

Figure 6. Death rates for tuberculosis (all forms) by State, 1947.

In all States, the tuberculosis death rate for 1947 was well below the prewar level. Only two States showed a decrease in rate of less than 10 percent between the 1939–41 average and 1947. These were South Dakota and Massachusetts, with declines of 7 percent and 9 percent, respectively. The reductions which occurred for residents of other areas ranged from 10 to 19 percent for 6 States, from 20 to 29 percent for 22 States and the District of Columbia, and from 30 to 38 percent for 16 States. The largest relative drops, over 40 percent, occurred for New Hampshire and Nevada residents.

The abrupt fall in the tuberculosis death rate for Nevada was concentrated almost entirely in the current year. As noted above, the Nevada rate fell 42 percent from 1946 to 1947, or almost as much as the total drop of 49 percent between the 1939–41 period and 1947. While the annual rates for Nevada have shown some fluctuation since the 1939–41 period, the drop is much greater than any which has occurred in recent years and probably cannot be fully evaluated until data for subsequent years become available.

Deaths in Institutions

Since persons with active respiratory tuberculosis constitute the major source of tuberculous infection in the United States, a primary means of control is protection of the healthy community through early isolation of the infectious case. Although mortality statistics cannot measure how effectively this is being accomplished, the data on deaths which occur outside of institutions represent an index of the minimum reservoir for spread of the disease. Thus it is significant that as late as 1947, almost one-third of all persons who died of respiratory tuberculosis—14,294—died outside of hospitals and sanatoria (table 8). However, it is encouraging to note that the frequency of death in the home has become smaller in recent years. The proportion of deaths from respiratory tuberculosis which occurred outside of institutions in 1939–41 was 44.2 percent, in 1946 was 32.9 percent, and in 1947 was 32.1 percent.

Table 8. *Number and percent of deaths from respiratory tuberculosis in institutions, by type of service and type of control: United States, 1939–41 average, 1946 and 1947*

Type of service and type of control	Number			Percent		
	1947	1946	1939–41 average	1947	1946	1939–41 average
Total	44,462	46,939	55,444	100.0	100.0	100.0
Deaths not in institutions	14,294	15,439	24,519	32.1	32.9	44.2
Deaths in institutions	30,168	31,500	30,925	67.9	67.1	55.8
Type of service						
General hospitals	11,451	11,888	12,450	25.8	25.3	22.5
Tuberculosis hospitals	13,721	14,290	13,041	30.9	30.4	23.5
Nervous and mental institutions	3,982	4,111	3,528	9.0	8.8	6.4
Other and unknown	1,014	1,211	1,906	2.3	2.6	3.4
Type of control						
Federal	3,268	3,441	2,541	7.4	7.3	4.6
State	7,854	7,990	21,871	17.7	17.0	39.4
County and city	14,254	14,690		32.1	31.3	
Nonprofit	3,420	3,988	4,727	7.7	8.5	8.5
Proprietary and unknown	1,372	1,391	1,786	3.1	3.0	3.2

Also encouraging is the fact that the increase in the proportion of respiratory tuberculosis deaths in tuberculosis institutions[3] has been greater than that in general hospitals. Since patients who die in general hospitals have usually been admitted late in the course of the disease, most of them are a source of danger to others for some period before admission. In the prewar period 1939–41, almost the same number of deaths from respiratory tuberculosis occurred in general hospitals, 22.5 percent, as in tuberculosis institutions, 23.5 percent. By 1947, the difference in these proportions was much greater: 25.8

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[3] According to the classification used by the National Office of Vital Statistics, institutional deaths are classified according to the major type of service rendered. Thus, only those institutions devoted primarily to the care of tuberculous patients are considered tuberculosis institutions. Deaths occurring in a specialized tuberculosis section of a general hospital are allocated to general hospitals. The same procedure is followed for mental and other types of hospitals.

Table 9. *Number of deaths from respiratory tuberculosis in institutions, by type of service and type of control: United States and each State, 1947*

[By place of residence. Exclusive of deaths among armed forces overseas]

Area	Total	Deaths not in institutions	Deaths in institutions	Type of service				Type of control				
				General hospital	Tuberculosis hospital	Nervous and mental hospitals	Other and unknown institutions	Federal	State	County and city	Nonprofit	Proprietary and unknown
United States	44,462	14,294	30,168	11,451	13,721	3,982	1,014	3,208	7,854	14,254	3,420	1,372
Alabama	1,055	653	402	142	185	60	15	90	75	141	77	19
Arizona	595	209	386	241	102	21	22	187	27	91	47	34
Arkansas	764	366	398	78	246	68	6	56	294	14	23	11
California	3,175	537	2 638	1,582	750	214	92	314	219	1,820	149	136
Colorado	341	90	251	146	74	21	10	46	21	52	98	34
Connecticut	461	82	379	118	187	50	24	30	226	42	65	16
Delaware	116	38	78	11	65		2	4	63	1	10	
Dist. of Columbia	455	44	411	243	142	24	2	95	2	301	8	5
Florida	753	187	566	209	278	47	32	63	276	176	36	15
Georgia	966	493	473	122	235	113	3	65	270	116	13	9
Idaho	59	26	33	19	2	7	5	3	7	4	12	7
Illinois	2 628	481	2 147	862	949	295	41	152	280	1,457	184	74
Indiana	972	393	579	186	294	82	17	62	137	305	59	16
Iowa	287	67	220	54	100	59	7	19	119	50	28	4
Kansas	298	84	214	51	113	43	7	31	148	9	22	4
Kentucky	1,346	893	453	126	204	111	12	94	106	174	40	39
Louisiana	927	428	499	319	89	79	12	81	351	39	12	16
Maine	171	60	114	27	60	23	4	8	78		23	5
Maryland	1,108	344	764	322	361	61	20	77	382	207	87	11
Massachusetts	1 481	224	1,257	294	716	202	45	134	305	674	104	40
Michigan	1,518	206	1 312	401	726	98	87	41		694	277	102
Minnesota	516	59	457	126	218	110	3	30	149	239	32	7
Mississippi	682	471	211	90	75	42	4	58	86	19	37	11
Missouri	1,212	385	827	292	436	75	24	86	189	464	74	14
Montana	130	46	84	37	40	5	2	18	38	9	8	11
Nebraska	187	36	151	63	59	27	2	11	84	31	16	9
Nevada	38	7	31	28	2		1	6		19	4	2
New Hampshire	76	27	49	14	24	10	1	4	21	4	7	13
New Jersey	1,459	227	1,232	276	736	200	20	25	165	864	143	35
New Mexico	289	124	165	85	68	7	5	81	38		36	10
New York	4,972	710	4 262	1,869	1,793	452	148	272	546	2,679	669	96
North Carolina	1,047	386	661	89	467	88	17	115	201	19	40	22
North Dakota	77	17	60	12	33	15		6	47	1	4	2
Ohio	2,160	603	1,557	559	747	210	41	124	219	966	110	138
Oklahoma	656	353	303	76	161	62	4	66	192	5	18	25
Oregon	284	66	218	55	112	37	14	25	91	67	23	12
Pennsylvania	3,204	960	2,244	1,030	791	301	122	150	692	865	409	119
Rhode Island	216	46	170	19	86	30	35	7	104	36	11	12
South Carolina	507	145	362	57	236	67	2	28	224	84	19	7
South Dakota	145	46	99	32	46	20	1	42	38	1	15	3
Tennessee	1,430	942	488	165	226	78	19	61	82	228	92	25
Texas	2,629	1,594	1 035	387	445	173	30	176	296	371	113	79
Utah	76	18	58	28	27		3	11	25	11	6	5
Vermont	114	44	70	7	44	18	1	2	59	1	5	3
Virginia	1,159	598	561	175	263	95	28	67	229	147	67	51
Washington	532	73	459	162	213	76	8	86	73	230	35	35
West Virginia	618	308	310	62	166	77	5	24	234	14	23	15
Wisconsin	539	92	447	90	32	25	9	40	27	336	32	12
Wyoming	29	6	23	13	6	4		6	11	3	1	2

percent occurred in general hospitals and 30.9 percent in tuberculosis institutions. The most rapid increase has occurred in the proportions of respiratory tuberculosis deaths in nervous and mental institutions. This proportion rose from 6.4 percent in the 1939–41 period to 9.0 percent in 1947.

Of the deaths from respiratory tuberculosis in 1947, 32.1 percent took place in county and city institutions, and 17.7 percent were cared for in State institutions. Almost the same numbers occurred in nonprofit as in Federal hospitals, 7.7 percent and 7.4 percent, respectively, and 2.7 percent occurred in private institutions.

The increase in the proportion of respiratory tuberculosis deaths occurring in institutions is entirely accounted for by the increased proportion of deaths in public hospitals. The percentage of deaths from respiratory tuberculosis occurring in State, county, and city institutions increased from 39.4 percent in 1939–41 to 49.7 percent in 1947. On the other hand, the percentage of deaths in nonprofit institutions declined from 8.5 percent in 1939–41 to 7.7 percent in 1947, and the proportion occurring in proprietary institutions has remained about the same.

Table 9 presents the distribution of respiratory tuberculosis deaths in institutions for residents of each State in 1947, by type of service and control. Among the States, the proportions of respiratory tuberculosis deaths in 1947 which occurred in institutions varied widely, ranging from 30.9 percent for residents of Mississippi to 88.6 percent for Minnesota. The percentage of institutionalized deaths for the District of Columbia, 90.3, exceeded that for any of the States.

Hospitalization at death in 1947 was lowest for residents of four contiguous southern States, Mississippi, Kentucky, Tennessee, and Alabama, and for the State of Texas. For these areas, over 60 percent of the deaths from respiratory tuberculosis occurred in the home. The largest relative numbers of deaths from respiratory tuberculosis in institutions (over 85 percent) were recorded for residents of the north central States, Michigan and Minnesota, as well as Washington and New York.

Summary

This paper, the sixth in a series of annual reports, presents statistics of tuberculosis mortality in the United States for 1947 and compares them with data for 1946 and for the prewar period 1939–41.

In 1947, there were 48,064 deaths from tuberculosis in the United States, a decrease of 6 percent from 1946. The death rate in 1947 was 33.5 per 100,000 population, 8 percent below the rate for 1946.

The decrease in the tuberculosis death rate between 1946 and 1947 continued the downward trend which has prevailed with few interruptions since 1910. The drop in the rate between 1910 and 1947 was smaller for white males (77 percent) than for white females (86 percent) and somewhat smaller for nonwhite males (79 percent) than for nonwhite females (81 percent).

Of the total deaths from tuberculosis in 1947, 92.5 percent were attributed to respiratory tuberculosis. For both respiratory and nonrespiratory tuberculosis, mortality was substantially greater for nonwhites than for whites and for males than for females. The sex differential was considerably greater for respiratory than for nonrespiratory tuberculosis, whereas the race differential was greater for the nonrespiratory forms.

As a result of the method of classifying associated causes of death, the recorded frequency of death from nonrespiratory tuberculosis markedly understates the number of deaths with nonrespiratory involvement. The effect of this factor is indicated by a tabulation of deaths in 1940 by primary and secondary causes.

Death rates for tuberculosis in the white population and for nonwhite males were lower in the childhood and young adult years than in the older age groups, while for nonwhite females the highest rates occurred in the young adult group. Among children and young adults, the rates were higher for females than for males; among older persons, the rates were much higher for males The rates for nonwhites were far above those for whites in all age groups except 75 years and over.

Death rates for tuberculosis (all forms) were lower in 1947 than in 1939 41 for almost all population groups. In general, greater gains were made by females than by males, and by younger than by older persons. The only increases in rate recorded were for males in the age groups over 55 years and for nonwhite females [illegible] 74 years of age.

Tuberculosis death rates in 1947 by State of residence ranged from 11.8 for Iowa to 100.0 for Arizona. Between 1946 and 1947, decreases in rate occurred for 40 States, the rate for 1 State remained the same, and increases occurred for 7 States. Between 1939 41 and 1947, decreases in rate occurred for all States.

Of the deaths from respiratory tuberculosis in 1947, 14,294 or 32.1 percent occurred outside of institutions, and 30,168 or 67.9 percent occurred in institutions. Of the total respiratory tuberculosis deaths, 25.8 percent occurred in general hospitals, 30.9 percent in tuberculosis hospitals and sanatoria, and 9.0 percent in mental hospitals.

The distribution of deaths from respiratory tuberculosis by type of control of the institution was: county and city hospitals, 32.1 percent; State institutions, 17.7 percent; nonprofit institutions, 7.7 percent; Federal institutions, 7.4 percent; private institutions, 2.7 percent.

Among the States, the proportions of deaths from respiratory tuberculosis in 1947 which occurred in institutions varied widely from 30.9 percent for residents of Mississippi to 88.6 percent for Minnesota, and 90.3 percent for the District of Columbia.

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A Collodion Agglutination Test for Histoplasmosis

By Capt. Samuel Saslaw, MC, AUS, and Charlotte C. Campbell*

Previous studies from this laboratory (*1*) have shown that sera from rabbits immunized with *Histoplasma capsulatum* agglutinated collodion particles sensitized with histoplasmin. These observations suggested the use of the collodion agglutination technique as an additional means of investigating certain immunologic aspects of human histoplasmosis.

Since the exact significance of the skin test reaction to histoplasmin is not known, the collodion agglutination test has been employed with human sera in this study as a medium for determining whether correlation between histoplasmin skin-sensitivity and humoral antibodies against histoplasmin can be demonstrated. An attempt has also been made to determine the potential value of the test as a diagnostic tool in histoplasmosis.

Materials and Methods

Test Subjects. Three categories of persons were studied. Group I consisted of healthy normal volunteers on whom histoplasmin skin test studies were done simultaneously with serum antibody titrations. Group II consisted of persons whose sera were selected at random from specimens submitted for routine Wasserman and Kahn tests; no skin sensitivity data were available for comparison to the antibody titrations against histoplasmin. Similar antibody determinations were made in group III which consisted of skin-test positive, proved cases of histoplasmosis.

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Skin-testing. Each person in group I was injected intradermally on the anterior surface of the forearm with 0.1 cc. of a 1:1000 dilution of histoplasmin (lot H-40[1]). Readings were made after 48 hours. Reactions showing induration or edema measuring 5 mm. or more in diameter were considered positive.

Serum. Blood from group I volunteers was obtained by venipuncture immediately prior to skin testing. The sera from these persons were tested for antibody content 24 hours after the specimens were obtained, whereas the serum samples in groups II and III were tested within 24 hours of receipt.

Collodion Agglutination Test. Collodion particles were prepared according to the method of Calvelti (*2*), and the test conducted exactly as described in the previous report (*1*). Human sera, however, were inactivated at 56° C. for 30 minutes instead of the 60° C. temperature required to eliminate certain nonspecific reactions encountered in our studies with rabbit serum. Agglutinations were recorded in decreasing gradations of 4+, 3+, 2+ and 1+. A reaction was considered 4+ when the agglutinated particles were flaky and 1-1½ mm. or more in diameter; 3+ when the suspending menstruum mained clear but the still flaky particles were slightly less than 1 mm. in diameter; 2+ when the particles appeared to be finely granular in a slightly cloudy suspending menstruum and 1+ when the exceedingly fine but still readily visible particles were suspended in a solution more cloudy than in a 2+ reaction.

Results

Group I. Volunteers for this study were obtained from the personnel of the Army Medical Department Research and Graduate School. This group was unique in that most of the members were not originally residents of the District of Columbia but represented a markedly heterogenous geographical population. Only 13 of the 197 persons studied were native Washingtonians. The remaining subjects included representatives of 40 States as well as Canada, the Philippine Islands, Brazil and Turkey.

Skin Test Response. Positive skin tests were obtained in 71 of 197, or 36 percent of the persons studied. Negative reactions were recorded in 126. Since this number is obviously not great enough to be of statistical value when broken down State by State, no attempt will be made to evaluate such data in this report. It was interesting to note, however, that relatively few positive reactions were obtained in natives outside the area "endemic" for histoplasmosis.

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[1] Furnished by Dr Arden Howell, Jr, Public Health Service, Duke University, Durham, N. C.

Agglutination Reactions. Collodion particles sensitized with histoplasmin were agglutinated by the sera of 60 (30.4 percent) subjects in serum dilutions varying from 1:5 to 1:40. In none of these did the intensity of the reaction exceed 2+. Approximately 90 percent were no stronger than 1+. As noted in table 1, 13 (21.7 percent) of the 60 "positive" reactions occurred in 1:5 dilutions of serum, 29 (48.3 percent) in 1:10, 14 (23.3 percent) in 1:20 and only 4 (6.7 percent) in 1:40.

Table 1. *Classification of 197 normal volunteers according to histoplasmin sensitivity and agglutinative capacity of sera*

Number persons	Skin sensitivity to H 40	Number of sera causing weak agglutinations (1+ - 2+)					
		Dilutions					Total
		1:5	1.10	1:20	1:40	1.80	
71	Positive	5	9	9	2	0	2
126	Negative	8	20	5	2	0	3
		13	29	14	4	0	6

Twenty-five sera from the skin-test positive group of 71 and 35 sera from the skin-test negative group of 126 persons gave "positive" agglutinations. Thus, in normal persons the correlation between skin tests and serum-agglutination tests appears to be masked by nonspecific reactions.

In accord with the results obtained in group III below, it can be assumed that the weak 1+ and 2+ reactions obtained in low serum dilutions can be termed as nonspecific and of no significance.

Group II. A total of 235 serum specimens which had been submitted for routine Wasserman and Kahn tests were selected at random and tested for antibodies against histoplasmin. No skin testing was done in this group. The results obtained in this study were essentially in accord with those noted in group I, in that 76 (32.3 percent) of the sera gave weak 1+ to 2+ reactions in low dilutions. Here again the reactions were predominantly only 1+ in intensity and were more frequent in the 1:5 and 1:10 dilutions of serum.

Group III. Serum was obtained from six persons known to have histoplasmosis. Three of this group were bed-patients in an acute phase of the disease while three were ambulatory chronic cases. All were skin-test positive.

Case 1. Serum obtained from an acutely ill 8-year-old boy on the 15th day of his illness showed 4+ agglutination of sensitized collodion particles up through serum dilutions of 1:80 and a 3+ reaction at 1:160. The intensity of reaction and the high titer was considerably greater than anything observed in the "normal" sera above. A second specimen was drawn on the 42d day when the patient was showing considerable improvement clinically but was still running a low-grade fever as compared to the previous stormy febrile course. As noted in table 2, his serum titer had dropped somewhat on the 42d day with 4+ reactions occurring only through 1:20 dilutions of serum; 3+ and 2+ reactions remained at 1:40 and 1:80, respectively. Another specimen obtained on the 78th day of illness showed a further slight decrease in agglutinating capacity as indicated by 4+ reactions through 1:10 and 3+, 2+ and 1+ reactions in serum dilutions of 1:20, 1:40 and 1:80, respectively.

Case 2. Serum obtained on the 13th day of illness in an acutely sick 5-year-old boy yielded 3+ agglutinations in serum dilutions up to 1:10 and a 1+ reaction at 1:20. Only the intensity of reaction differed from results obtained in normal volunteers (1+ to 2+). A second specimen taken on the 40th day of the disease, however, caused 4+ agglutinations through serum dilutions of 1:20 and 2+ and 1+ reactions in 1:40 and 1:80, respectively.

Table 2. *Collodion agglutination tests, corresponding complement fixation titers and related data in six cases of histoplasmosis with positive skin tests*

Case number	Phase of disease	Serum specimen number	Interval between specimens (days)	Degree of agglutination serum dilutions							Corresponding complement fixation titers [1]
				1:5	1:10	1:20	1:40	1:80	1:160	1:320	
1	Acute	1	(2)	4+	4+	4+	4+	4+	3+	±	1:1280
		2	27	4+	4+	4+	3+	2+	±		1:640
		3	36	4+	4+	3+	2+	1+			1:80
2	do	1	(3)	3+	3+	1+					1:40
		2	27	4+	4+	4+	2+	1+			1:160
3	do	1		4+	4+	4+	3+	2+	1+		1:160
4	Chronic	1		2+	1+	±	±				1:20
		2	30	2+	1+	±					1:20
5	do	1		2+	1+	±					1:20
		2	30	2+	1+	±					1:20
6	do	1		3+	2+	1+					[4] AC

[1] For further description of complement fixation with yeast antigens (*6*)

[2] 15th day of illness

[3] 13th day of illness.

[4] Anticomplementary.

Case 3. A single specimen obtained from a white male adult in the acute phase of the disease showed 4+ agglutination through serum dilutions of 1:20 and 3+, 2+ and 1+ reactions in 1:40, 1:80 and 1:160 dilutions, respectively.

Cases 4, 5, 6. The sera of three ambulatory adults known to have had the disease from 2 to 5 years failed to show any 4+ reactions. In two of this set two separate serum specimens obtained approximately one month apart showed essentially the same results. As noted in table 2 the sera of cases 4 and 5 gave 2+ reactions in 1:5 dilutions and 1+ in 1:10. This was essentially the type of reaction observed in slightly less than one-third of the "normal" volunteers. The serum of case 6 caused a 3+ reaction at 1:5 the intensity of which was slightly but not significantly greater than "normal" levels, 2+ and 1+ reactions were obtained in 1:10 and 1:20 serum dilutions, respectively.

Comparable results were obtained with the sera in group III when yeast-phase antigens of *H. capsulatum* were employed in the complement fixation test previously described from this laboratory (*3*, *4*). These studies will be described in a separate report (*5*). However, for comparative purposes, the complement-fixing titers of the respective sera in group III are included in table 2.

Discussion

Preliminary studies employing the collodion agglutination test for detecting antibodies against histoplasmin in human sera are described. Microscopic collodion particles sensitized with histoplasmin, lot H 40, were strongly agglutinated in the presence of serum obtained from patients in the acute phase of histoplasmosis. These reactions were similar to those obtained in the presence of immune rabbit serum (*1*). Since detailed studies in this laboratory have shown that six different lots of histoplasmin from several sources were equally adaptable to the test (*6*), this phenomenon cannot be attributed to the reactivity of this single isolated lot.

In contrast to the strong reactions observed in sera from patients acutely ill with histoplasmosis, the serum of persons with chronic histoplasmosis agglutinated the collodion particles only weakly in a manner similar to that noted in less than one-third of normal volunteers.

In a group of 197 normal healthy volunteers of which 36 percent were found to be skin-test positive, 30.4 percent of the total gave weak agglutinations. None of these latter sera showed agglutinations stronger than 2+ while approximately 90 percent of those reacting gave weak 1+ reactions in low titer. The fact that the sera of 25 of the 71 skin-test positives as well as 35 of the skin-test negative group of 126 gave similar weak reactions suggested that reactions of 2+ or less in low titer (1:5 to 1:20) were nonspecific. Thus the correlation was masked between the skin test reaction to histoplasmin and the reaction of humoral antibodies. Similarly, 32.3 percent of a random sampling of 235 serum specimens which had been submitted for routine Wasserman and Kahn tests showed weak 1+ to 2+ reactions in low titer.

The above results appear significant as witnessed by the marked contrast in the intensity of agglutination and the higher titers of sera from patients with acute histoplasmosis as compared to sera from chronic cases or normal persons. Although much more material will have to be examined before definite conclusions can be made, observations made on the sera of a patient in the acute phase (case 1) wherein the titer of the serum was appreciably decreased after 2 months of the disease in addition to the lack of significant circulating antibodies in three chronic cases (4, 5, 6) imply a transient type of antibody response to *H. capsulatum* following infection.

The greater simplicity of the collodion agglutination test as well as the correlative results obtained with the complement fixation test suggests that this technique is worthy of further trial and analysis as a possible adjunct in the diagnosis and perhaps prognosis of acute histoplasmosis.

Summary

In the use of the collodion agglutination test for the detection of antibodies in human sera it has been shown that:

1. Collodion particles sensitized with histoplasmin were agglutinated strongly (4+) in the presence of sera from all of three patients in the acute phase of histoplasmosis; the sera from three patients in the chronic stage of the disease gave no significant results.

2. Weak (possibly nonspecific) 1+ or 2+ agglutinations were observed in low dilutions in 30.4 percent of a group of 197 healthy volunteers. Of the 60 persons giving weak agglutinations, 25 were from the positive skin-test group of 71 persons, and 35 were from the negative skin-test group of 126 persons. Similarly, 32.3 percent of 235 serum specimens from persons not skin tested gave weak nonspecific agglutinations. The correlation between skin tests and serum agglutination tests appears to be masked in normal persons by nonspecific reactions.

3. The results obtained in the collodion agglutination test parallel those observed with yeast-phase antigens in the complement-fixation test.

4. It is suggested that the collodion agglutination test be given further trial and study as a possible adjunct in the diagnosis of acute histoplasmosis.

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Characteristics of Commercial X-ray Intensifying Screens and Films—IV

By WILLARD W. VAN ALLEN[*]

Of fundamental and practical importance in evaluating films, screens and developers used in roentgenography is the characteristic of speed. As in photography, the speed of a film is a measure of the quantity of radiation, or exposure, necessary to produce a given effect. For many years it was customary to describe the speed of a roentgenographic film or film-screen combination by comparison with an arbitrarily chosen combination as a "standard." This method is open to the obvious objections that the "standard" combination may not remain constant and that the standard used by one investigator may be different from that used by another. This is especially true since screen and film manufacturers are constantly striving to improve their products, with the result that a combination chosen as standard today may have quite different characteristics when the next purchase is made.

In order to obviate these difficulties and establish the sensitometry of roentgenographic materials on a quantitative basis, the Electronic Laboratory of the Division of Tuberculosis undertook investigation of the factors determining the speed of roentgenographic materials and established a tentative definition of speed and the standard conditions for its measurement.[1]

In the course of this investigation it was found that the speed was dependent not only on the particular combination of film and screen involved, but also on the developer used. Rather than attempt to assign speed values to films, screens, and developers separately and invent a system for combining these separate numbers to describe adequately the speed of a given combination, it was felt to be more practical to evaluate directly the speed of each film-screen-developer combination as such.

As defined by this laboratory, the speed of a film-screen-developer combination is the reciprocal of the exposure, measured in deciroentgens, required to produce a density of 1.0 above base and fog. The following standard conditions are assumed:

1. Time of development to be that recommended by the manufacturer of the developer in question.

From the Rockville Laboratory, Division of Tuberculosis. For previous reports in this series see PUB HEALTH REP. 61: 312 (1946), 61: 1324 (1946), and 63: 746 (1948)

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[1] A complete report of this study will appear in a forthcoming issue of RADIOLOGY

2 Developer temperature to be 20° C

3. Continuous mechanical agitation to be maintained during development

4 Length of the exposure to be 1 0 second

5 Exposing radiation to have a half-value-layer of 4 mm of aluminum.

6 Temperature of film and screen during exposure to be 25° C

Table 1 *Speed of fluoroscopic screens Development 8 minutes in Eastman X ray developer (dry ingredients)*

Screen		Film			
Type	Date received	Eastman blue photoflure	Ansco a[1]	Fluorapid b[2]	Dupont fluorofilm
D (uncoated)	1945	60	70		65
	Nov 1947	130	130	155	130
	May 1948	100	115		105
	Nov 1948	115	120	150	115
DC (cleanable)	July 1947	95	10		100
	July 1947	110	115	140	110
	Nov 1947	95	95	120	95
	May 1948	85	105		95
666D	Dec 1947		80	100	80
	Apr 1948	100	100	125	100
	Apr 1948	105	10	130	10
	Dec 1948	100	100	125	100
		Eastman green photoflure			
B	1946	60			
	1946	70			
B 2	1947	95			
E 2	1947	140			
	1948	140			

[1] a=early sample (1948)
[2] b=recent sample (1948)

Having defined the speed and standard conditions as above the laboratory is now engaged in determining the speed of film screen-developer combinations of practical interest, and the results will be published in these pages from time to time, including additions and revisions as required

It soon became apparent, however, that, at least in certain cases, notably in combinations involving fluoroscopic screens, such a wide variation exists in the speed of different samples of the same screen type that it is quite impossible to assign a speed number to such a combination This variation in screens of the same type may be due to efforts toward improvement on the part of the manufacturer or to variations in the manufacturing process or both This inconsistency is apparent from the results shown in table 1, where the speeds of eight different samples of D screens and four samples of 666D screens are shown in combination with three types of film and one developer. It is equally obvious that any attempt to average the speed values would be misleading and therefore worthless. The table also serves to indicate the relative speeds of the three films when processed in Eastman X-ray developer.

It should be borne in mind that the speeds of fluoroscopic film-screen combinations were determined with the screen and film in direct contact and therefore do not represent the over-all speeds of these combinations in photofluorographic apparatus where the additional effects of separation and lens result in speeds less than those shown in the table. For this reason they should be interpreted as relative speeds only. The speed of these film-screen combinations with other developers will be reported in later issues.

Table 2. *Speed of the intensifying screens. Development: 4½ minutes in Eastman X-ray developer (dry ingredients)*

Screen	Film	
	Eastman blue brand	Dupont 508
Buck		
Extra speed	85	55
Midspeed	70	50
Definition	60	40
Eastman		
Ultraspeed	140	90
Fine Grain	110	70
Definition	80	50
Patterson		
High speed	120	80
Parspeed	90	55
Detail	25	20

Table 3. *Fog and Gamma. Development: Eastman X-ray developer (dry ingredients) in open tank*

Film	Use	Fog	Gamma	Time (minutes)
Ansco fluorapid	Photofluorographic	0.19	2.1	8
DuPont fluorofilm	do	.21	1.9	8
Eastman blue photoflure	do	.07	1.8	
Eastman green photoflure	do	.17	2.0	8
DuPont 508	Roentgenographic	.11	2.8	4½
Eastman blue brand	do	.18	2.6	4½

Table 2 gives the speeds, determined as above, of intensifying screens in combination with two films and Eastman X-ray Developer. As for fluoroscopic screens, this table will also be enlarged in subsequent issues to include other films and developers.

Table 3 shows the average values of fog and gamma (contrast) observed for the films reported above. It should be noted that these values are for development in an open tank with continuous mechanical agitation at 68° F. for the times listed.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 12, 1949

Summary

A total of 28,520 cases of measles was reported during the current week, as compared with 27,727 last week and a 5-year median of 20,408. Increases totaling 2,131 cases, the largest in the Middle Atlantic and South Atlantic areas, occurred in 5 of the 9 geographic divisions, partly offset by a net decline of 1,338 cases in the New England, West North Central, and South Central areas. The 6 States showing increases of more than 147 cases (last week's figures in parentheses), are as follows: New York, 2,316 (2,042), Pennsylvania, 2,777 (2,474); Virginia, 1,197 (615), North Carolina, 827 (598); Alabama, 847 (611); and California, 2,017 (1,559) In past years for which data are available, the peak of weekly incidence of measles has infrequently been reported before the end of March.

The incidence of influenza declined during the week from a total of 4,609 cases last week to 3,948 currently. Only 6 States reported more than 87 cases, only 2 of which (Virginia, 387—last week 367; and Arkansas, 193—last week 180) showed increases The total to date is 45,307, same period last year (also the 5-year median) 107,067.

Of 64 cases of poliomyelitis, 13 occurred in California (last week 7), 7 in Texas (last week 5), 6 in Mississippi (last week 1), and 4 each in Michigan and Washington No other State reported more than 3 cases.

Of 8 cases of smallpox reported (the largest number for any week since May 17, 1947), 4 occurred in Texas, 2 in South Dakota (last week 1), and 1 each in Ohio and Kansas.

A total of 9,829 deaths was recorded during the week in 94 large cities in the United States, as compared with 9,801 last week, 9,829 and 10,365, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946-47) median of 9,829. The total for the year to date is 98,877, corresponding period last year, 103,363. Infant deaths for the week totaled 682, last week 634, 3-year median 639. The cumulative figure is 6,725, same period last year 7,040.

Telegraphic case reports from State health officers for week ended Mar. 12, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1			412		8							5	
New Hampshire			1	18		1			3					
Vermont				333	1		1		4			1	3	
Massachusetts	9	2		1 364	1				263				64	
Rhode Island				363		5			4				10	
Connecticut			19	507	1	65			56				10	
MIDDLE ATLANTIC														
New York	9		(b)	2,316	5	369	3		[a] 301			3	109	6
New Jersey	3		4	1 138	2	173	3		174			2	64	1
Pennsylvania	8		(b)	2,777	6		1		305			3	60	1
EAST NORTH CENTRAL														
Ohio	5			275	9	33	1		387	1		1	51	16
Indiana	13		2	128		12			112		1		16	27
Illinois	1	1	13	111	5	151	1		204		1	2	28	1
Michigan [a]	1		21	785	3	52	4		439			2	53	2
Wisconsin	1		81	940	3	14			71				29	
WEST NORTH CENTRAL														
Minnesota	2			111	1	12	2		36					
Iowa				34	1	2			24				2	8
Missouri			6	559	2	25	1		22				5	
North Dakota			13	36	1				3				7	
South Dakota				21		1			6	2			6	
Nebraska			4	28		2	1		13					
Kansas	1		4	1 291		11			34	1			7	
SOUTH ATLANTIC														
Delaware				16					14					
Maryland [a]	4		2	1 519	1	53			[a] 47			1	13	
District of Columbia	3			82		9			8					
Virginia	4		387	1 197	2	165			22		1		37	2
West Virginia	4		78	61		19	3		31				22	
North Carolina	6			827	2				20		2		32	
South Carolina	4	1	549	298	1	174	3		5				25	4
Georgia	1		14	407		26			8		1	3		12
Florida	3		10	137		8	2		4		1	1		3

EAST SOUTH CENTRAL														
Kentucky	9	---	6	371	---	108	---	---	47	---	---	3	25	14
Tennessee	2	---	74	420	1	50	---	---	23	---	2	---	9	---
Alabama	5	---	117	847	1	45	1	---	16	---	---	1	15	7
Mississippi [a]	8	1	44	96	1	33	6	---	4	---	3	2	---	---
WEST SOUTH CENTRAL														
Arkansas	3	---	193	541	---	48	---	---	2	---	2	1	9	1
Louisiana	6	---	15	43	1	99	1	---	9	---	4	7	13	---
Oklahoma	2	---	77	335	1	40	1	---	6	---	---	---	1	1
Texas	19	---	1,873	3,750	9	586	7	---	49	4	---	4	123	26
MOUNTAIN														
Montana	1	---	8	70	1	16	---	---	24	---	---	---	1	---
Idaho	6	---	5	129	---	7	---	---	[c] 31	---	---	3	1	---
Wyoming	---	1	---	17	---	16	---	---	7	---	---	---	---	---
Colorado	5	---	36	417	2	24	---	---	13	---	---	2	6	---
New Mexico	---	---	7	238	1	42	---	---	24	---	---	2	19	---
Arizona	6	---	125	151	1	29	1	---	16	---	---	1	18	---
Utah [a]	---	---	---	58	---	3	3	---	10	---	---	---	16	---
Nevada	---	---	---	---	---	---	---	---	---	---	---	---	---	---
PACIFIC														
Washington	---	---	37	518	1	9	4	---	56	---	---	---	14	---
Oregon	---	---	36	411	1	33	1	---	12	---	---	---	8	---
California	12	---	87	2,017	5	48	13	---	[c] 147	---	---	5	67	2
Total	167	6	3,948	28,520	73	2,526	64	---	3,123	8	18	50	1,003	---
Median, 1944-48	261	11	5,532	20,408	202	---	33	1	4,171	9	14	44	2,254	---
Year to date, 10 weeks	1,802	69	45,307	189,750	870	24,595	872	12	28,232	20	300	414	10,440	---
Median, 1944-48	2,972	85	107,067	122,429	2,047	---	373	4	32,501	72	208	437	22,390	---
	(27th)		(30th)	(35th)	(37th)		(11th)		(32nd)	(35th)		(11th)	(39th)	
Seasonal low week ends	July 10	---	July 31	Sept. 4	Sept. 18	---	Mar. 20	---	Aug. 14	Sept. 4	---	Mar. 20	Oct. 2	---
Since seasonal low week	6,916	---	81,577	242,143	1,714	---	28,199	---	50,930	35	---	3,533	20,473	---
Median, 1943-48	10,538	---	150,625	148,553	3,551	---	13,780	---	71,072	148	---	4,674	47,091	---

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[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever, reported separately, as follows: Vermont 1; New York 1; Georgia 3; Louisiana 3; Texas 2; Colorado 2; Arizona 1; California 2; salmonella infections, not included, were reported separately as follows: Massachusetts 1; New York 2; Maryland 1.

Alaska: Influenza 15; measles 4; pneumonia 1; streptococcal sore throat 3.

Territory of Hawaii: Influenza 740; measles 194, poliomyelitis 2; 702 delayed influenza reports for January and February included.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended February 26, 1949.—During the week ended February 26, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		44	1	325	780	30	86	66	374	1 706
Diphtheria				12	1	1	1	2	1	18
Dysentery bacillary				2						2
Encephalitis infectious					1					1
German measles				199	38		17	6	12	272
Influenza		15			43	4			3	65
Measles		238	8	453	422	231	316	328	152	2 148
Meningitis meningococcal		1	1			1	1		1	5
Mumps		23	1	136	217	39	49	22	115	602
Scarlet fever		1	3	134	91	5	2	22	16	274
Tuberculosis (all forms)		9	13	109	47	20	15	64	29	306
Typhoid and paratyphoid fever			1	7						8
Undulant fever					2	1				3
Venereal diseases										
Gonorrhea	1	5	15	78	48	25	20	33	90	315
Syphilis	3	7	13	110	37	7	8	6	24	215
Other forms									2	2
Whooping cough		1		143	30	12	11	3	7	207

COLOMBIA

Medellin—Typhoid fever.—Information dated March 8, 1949, states that typhoid fever has been declared epidemic in Medellin, Colombia, and vicinity The water and milk supply are reported to be contaminated

CUBA

Habana—Communicable diseases—4 weeks ended January 29, 1949.—During the 4 weeks ended January 29, 1949, certain communicable diseases were reported in Habana, Cuba, as follows

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	3		Poliomyelitis	3	
Diphtheria	10		Scarlet fever	1	
Malaria	3		Tuberculosis	16	
Measles	6		Typhoid fever	4	

Provinces—Notifiable diseases—4 weeks ended January 29, 1949.—During the 4 weeks ended January 29, 1949, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	6	16	12	22		16	72
Chickenpox		2		3	2		7
Diphtheria	1	24	4	1	2	3	35
Hookworm disease		1					1
Leprosy		2				1	3
Malaria	1	12		4	5	254	276
Measles		3					3
Poliomyelitis		5				2	7
Scarlet fever		1					1
Tuberculosis	6	30	13	14	14	23	100
Typhoid fever		8	2	6	8	35	59
Whooping cough		2					2
Yaws						1	1

[1] Includes the city of Habana.

GOLD COAST

Cerebrospinal meningitis.—An outbreak of cerebrospinal meningitis which is considered epidemic is reported in the Northern Territories, Gold Coast. Since January 1, 1949, a total of 3,659 cases with 293 deaths is stated to have occurred. About 50 percent of the new cases and 30 percent of the deaths were reported during the week February 24–March 1.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Plague

India—Cawnpore.—During the week ended March 5, 1949, 14 cases of plague were reported in Cawnpore, India.

Peru.—During the period November 1–30, 1948, 21 cases of plague with 2 deaths were reported in Peru, distributed as follows: Ancash Department, Huauri Province, Yurayaco 4 cases, 2 deaths, Acopara 2 cases; Lima Department, Chancay Province, Chambara Farm 1 case, Huaura Valley, Vilcahuaura Farm 1 case, Huarmey 2 cases; Piura Department, Huancabamba Province, Huaricanchi 1 case, Lauche 3 cases, Quispe 3 cases, Sondor 4 cases.

The 9 cases of plague reported in December 1948 (see Public Health Reports for February 25, 1949, p. 254) were distributed as follows: Cajamarca Department, Chota Province, Saramba 2 cases; Lambayeque Department, Chiclayo Province, Carbonera 1 case, 1 death, Fundo San Jose 1 case, Chaloque Farm 1 case, Monsefu 1 case; Lima Department, Huacho Province, St. Maria, Tambo Blanco, 1 case; Piura Department, Huancabamba Province, Lauche 1 case (not yet confirmed), Matara 1 case.

Smallpox

Arabia—Aden Protectorate.—Smallpox has been reported in the port of Makalla, Aden Protectorate, Arabia, as follows: For the period February 22–28, 1949, 14 cases; February 28–March 5, 4 cases.

China.—Smallpox has been reported in China as follows: During the period February 1–10, 1949, Canton, 28 cases; February 11–20, Amoy, 26 cases; week ended February 26, Shanghai, 18 cases.

India.—Smallpox has been reported in cities in India as follows: Week ended February 19, 1949, Ahmedabad, 46 cases, 18 deaths; week ended February 26, Bombay, 75 cases, 23 deaths, Madras, 43 cases, 4 deaths; week ended March 5, Bombay, 77 cases; Madras, 44 cases.

Indochina (French).—During the week ended February 26, 1949, 695 cases of smallpox with 315 deaths were reported in French Indochina, including 622 cases, 305 deaths, in Luang-Prabang Province, Laos State, and 55 cases, 3 deaths, in Tonkin State.

Netherlands Indies—Java—Batavia.—During the week ended February 19, 1949, 31 cases of smallpox were reported in Batavia, Java.

Pakistan—Chittagong.—For the week ended March 5, 1949, 17 cases of smallpox with 6 deaths were reported in Chittagong, Pakistan.

DEATHS DURING WEEK ENDED MAR. 5, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 5, 1949	Corresponding week, 1948
Data for 94 large cities of the United States		
Total deaths	9,901	9,832
Median for 3 perior years	9,929	
Total deaths, first 9 weeks of year	89,048	93,534
Deaths under 1 year of age	634	675
Median for 3 prior years	671	
Deaths under 1 year of age, first 9 weeks of year	6,043	6,400
Data from industrial insurance companies		
Policies in force	70,565,749	71,199,020
Number of death claims	13,645	15,519
Death claims per 1,000 policies in force, annual rate	10.1	11.4
Death claims per 1,000 policies, first 9 weeks of year, annual rate	9.6	10.6

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 64 APRIL 8, 1949 NUMBER 14

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A Replacement for Loeffler in Diphtheria Diagnosis

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Public Health Reports

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Statistical Studies of Heart Disease

IV. Mortality from heart disease (all forms) related to geographic section and size of city

By Mary Gover *

This is the fourth in a series of studies dealing with the statistics of heart disease morbidity and mortality. The studies are prepared jointly by the Division of Public Health Methods, Public Health Service, and the National Office of Vital Statistics with the cooperation of the Division of States Relations.

Any possible relationship of heart disease mortality with geographic section and population size can be appraised only in a general manner from vital statistics data. Resident age-adjusted rates of mortality from heart disease specific for sex, color, and size-of-city in each geographic section are obtainable from vital statistics tabulations and give an over-all picture of variation with respect to section and urbanization. Other variables such as income and occupation may influence heart disease mortality, but are not usually obtainable from routine tabulations of death certificates.

Source of the Data

The source of the data for this study is the annual report of deaths made by the National Office of Vital Statistics, supplemented by an unpublished tabulation of resident deaths from heart disease in 1940, specific for age, sex, race, urbanization, and geographic section of the United States. Mortality rates based on these data have been adjusted for age for purposes of geographic comparison—those for States by the indirect and those for geographic section by the direct method (*2*, pp. 270–276). Because of some degree of overlapping of diagnosis, mortality from intracranial lesions of vascular origin and from nephritis are included in this study in nearly the same detail as mortality from heart disease.

---

* Biostatistician, Public Health Service.

The broad divisions of heart disease identified by the International List of Causes of Death are (1) congenital diseases of the heart, (2) acute rheumatic heart disease, (3) cardiovascular syphilis, and (4) a large classification group, including acute endocarditis, chronic conditions of the valves and endocardium, diseases of the coronary arteries, chronic myocarditis and other degenerative forms of heart disease. The present statistical study considers only a total of the last named group designated as heart disease (all forms) and tabulated in 1940 under International List numbers 90–95.

Approximately half of all death certificates are certified by physicians as due to multiple causes. When this is the case, selection of the primary cause of death is usually made in accordance with the Manual of Joint Causes of Death.[1] Heart disease, nephritis, and intracranial lesions of vascular origin are interrelated causes, and are therefore frequently reported jointly. According to the Joint-Cause Manual, nephritis is usually preferred over heart disease and heart disease over artery conditions. The 1940 tabulation of associated causes of death gives heart disease as contributory to nephritis in 42 percent of deaths due to nephritis and in 1 percent of deaths due to intracranial lesions of vascular origin. Among deaths due to heart disease 8 percent are primary over intracranial lesions of vascular origin and 2 percent over nephritis.

Coding procedure is uniform for the entire country. There are known to be geographic differences, however, in the relative frequency in the reporting of multiple causes of death by physicians among the several geographic sections (*1*), related probably to the urban character of a district and to proximity to large centers of medical practice. This geographic variability in the frequency of reporting of multiple causes results in geographic differences in the relative number of death certificates referred to the Joint-Cause Manual in a selection of the primary (tabulated) cause of death. The almost perfect agreement between tabulated frequency of primary and associated cause of death and Manual preference (*5*) indicates that in the selection of primary cause of death reliance has been placed upon this arbitrary standard almost exclusively.

Recent Trend

Age-adjusted mortality from heart disease in the death registration area has increased from a rate of 253 in 1930 to 292 per 100,000 in 1940, an annual increase of 1.5 percent (*4*). Similar trends by geographic section are shown in figure 1 and table 1. Percentage change in mortality in the several sections has been determined for the period

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[1] For a detailed account of allocation to primary and contributory cause of death together with tabulated frequencies and a consideration of changes in coding procedure, 1900 to the present, see earlier studies in this series (*4, 5*).

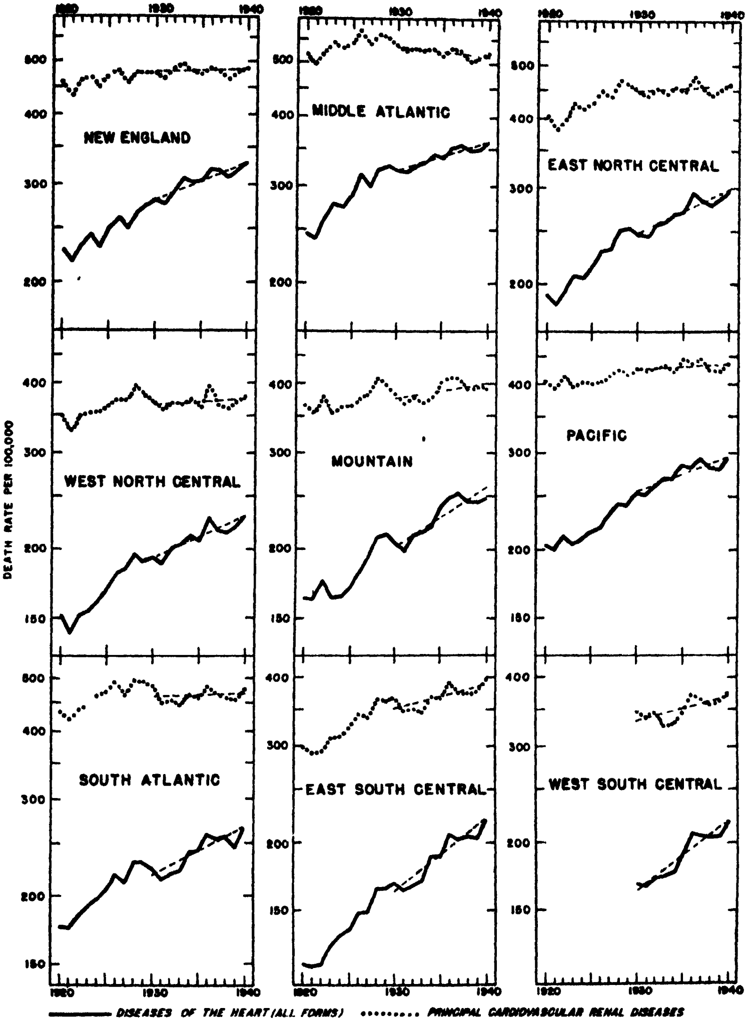


Figure 1. Rate of change in mortality from diseases of the heart (all forms) and from a total of the major cardiovascular-renal diseases in each of the nine geographic sections of the United States, 1920–1940.

1930 through 1940 by fitting straight lines to the logarithms of the rates; the slopes of the fitted lines with their probable error are shown in table 3. For comparative purposes, mortality from a total of the principal cardiovascular-renal diseases, including heart disease, is also given in figure 1 and in tables 2 and 3.

Table 1. *Trend of mortality from diseases of the heart (all forms) in 9 geographic sections; age-adjusted death rate per 100,000 population* [1]

Year	New England	Middle Atlantic	East North Central	West North Central	South Atlantic (white)	East South Central (white)	West South Central (white)	Mountain	Pacific
1920	227.1	246.1	191.8	152.3	176.1	119.2	----------	162.6	202.8
1921	217.5	241.3	183.0	140.6	174.7	117.6	----------	162.0	200.4
1922	231.7	262.0	194.3	151.9	182.7	118.8	----------	175.3	211.7
1923	242.5	278.0	207.4	154.3	191.4	129.3	----------	168.0	205.5
1924	229.6	273.8	205.1	161.1	196.9	134.9	----------	163.9	211.3
1925	251.2	288.5	215.7	168.0	204.6	137.7	----------	171.3	215.1
1926	261.1	313.4	230.5	181.3	218.6	148.5	----------	182.4	219.4
1927	251.1	297.9	231.6	183.9	212.6	149.3	----------	196.1	231.6
1928	266.3	320.9	251.4	196.5	230.5	164.5	----------	209.7	241.9
1929	273.8	323.9	252.7	190.5	239.7	165.4	----------	213.0	240.7
1930	778.7	318.7	246.3	192.6	224.2	167.7	168.0	204.0	282.6
1931	274 7	316.0	243.9	188.8	213.6	163.3	165.9	197,8	251.9
1932	288.5	323 5	256.9	200.8	219.5	167.2	171.4	212.4	259.1
1933	304 5	329.4	260.4	203.6	221.7	170.7	173.0	214.1	268.7
1934	301.5	340.3	268.7	211.9	241.4	187.8	176.0	220.1	268.8
1935	302.9	334.5	271 4	206.5	241.5	188.5	186.7	239.5	284.8
1936	317.6	351.3	294.5	228.5	259.1	206.7	207.5	248.4	282.0
1937	316.1	354.1	284.3	216.6	254.7	202.9	205.4	253.3	292.7
1938	308.1	346.1	279.5	215.4	256.2	204.6	204.3	245.0	282.0
1939	316.1	348.2	287.1	219.5	246.0	203.1	205.3	244.4	279 6
1940	327.1	360.3	295.9	230.1	266.4	219.8	218.6	246.9	292.7

[1] Deaths are by place of occurrence and are for white persons wherever available.

Annual rates for each section were adjusted to the age distribution of the total population, enumerated 1940, according to the following method: mortality rates for heart disease and the principal cardiovascular-renal diseases were adjusted for age by the usual direct method for the census years, 1920, 1930, and 1940. Ratios of adjusted to crude rates were computed for the 10-year intervals: annual ratios were obtained by interpolation between the ratios for 1920 and 1930, and those for 1930 and 1940. Age-adjusted rates for successive years as tabulated, are the product of these annual ratios multiplied by annual crude rates, as of July 1.

The entrance of individual States at irregular intervals into the area comprising the Death Registration States made some adjustment of the above method necessary. Briefly, mortality rates for 1920 through 1929 are for the constant area of 1920, those for 1930 through 1940 are for the area of 1930. The States included in each section and decade are as follows: *New England:* All States, 1920–1940; *Middle Atlantic:* All States, 1920–1940; *East North Central:* All States, 1920–1940; *West North Central:* Minnesota, Missouri, Nebraska, and Kansas, 1920–1940; Iowa, North Dakota, and South Dakota, 1930–1940; *South Atlantic:* (White, except for Delaware and West Virginia) Delaware, Maryland, District of Columbia, Virginia, North Carolina, South Carolina, and Florida, 1920–1940; West Virginia and Georgia, 1930–1940; *East South Central:* (White) Kentucky, Tennessee, and Mississippi, 1920–1940; Alabama, 1930–1940; *West South Central:* (White) Arkansas, Louisiana, and Oklahoma, 1930–1940; Texas, 1933–1940; *Mountain:* Montana, Colorado, and Utah, 1920–1940; Wyoming, Idaho, New Mexico Arizona, and Nevada, 1930–1940; *Pacific:* All States, 1920–1940.

Table 2. *Trend of mortality from a total of the principal cardiovascular-renal diseases* [1] *in 9 geographic sections; age-adjusted death rate per 100,000 population* [2]

Year	New England	Middle Atlantic	East North Central	West North Central	South Atlantic (white)	East South Central (white)	West South Central (white)	Mountain	Pacific
1920	455.3	516.6	405.3	348.0	433.2	297.8	----------	366.2	404.8
1921	439.5	495.1	382.8	328.6	420.7	290.7	----------	354.0	393.0
1922	459.0	520.4	400.4	349.1	435.7	293.4	----------	378.4	411.7
1923	467.5	541.8	424.7	353.0	447.1	309.1	----------	354.9	396.3
1924	447.9	530.2	416.7	355.4	462.0	312.8	----------	361.8	401.9
1925	467.9	540.9	427.6	362.8	471.7	324.0	----------	365.4	399.7
1926	478.1	560.9	448.9	374.1	480.6	341.5	----------	374.6	401.9
1927	456.9	536.7	439.1	373.5	465.2	338.1	----------	383.9	413.1
1928	474.0	560.6	460.9	395.0	491.8	363.5	----------	407.7	434.2
1929	473.3	552.4	462.7	379.3	499.2	361.5	----------	397.0	415.1
1930	472.9	536.9	449.2	360.0	481.8	366.0	347.5	381.5	426.4
1931	464.4	524.4	440.3	358.3	450.8	346.3	357.6	365.1	421.6
1932	479.3	529.1	452.9	360.0	454.5	346.7	342.8	377.3	427.4
1933	466.9	525.5	446.0	366.5	444.9	345.0	324.7	368.5	429.0
1934	478.5	539.5	455.8	375.9	465.5	367.9	339.1	379.5	422.4
1935	471.4	514.5	450.6	361.8	458.0	365.5	342.9	402.5	442.9
1936	483.4	530.3	460.7	368.6	484.3	390.1	371.0	408.4	435.9
1937	476.6	533.1	453.8	366.2	466.2	374.9	361.8	404.4	441.6
1938	462.1	504.4	442.6	362.1	458.6	372.5	354.1	392.1	426.0
1939	475.4	510.2	452.6	370.6	455.5	375.2	361.9	391.7	428.5
1940	482.0	519.2	461.6	379.2	475.3	386.7	374.0	398.8	434.6

[1] See appendix table, footnote 2.

[2] See table 1, footnote 1.

Regional rates of mortality in time sequence (fig. 1) show considerable variability. It is obvious, however, that recorded heart disease mortality has increased, 1920–40, in all geographic sections; the rate of increase from 1930 to 1940 is greatest in the three Southern and the Mountain sections. Mortality from a total of the principal cardiovascular-renal diseases, or the sum of mortality from diseases of the heart (all forms), intracranial lesions of vascular origin, and nephritis (all forms) has, on the contrary, been practically stationary since 1930, except for a slight but significant increase in the rates in the East South and West South Central sections and a minor decrease in the Middle Atlantic region.

Table 3. *Average annual percentage change in mortality from diseases of the heart (all forms) and from a total of the principal cardiovascular-renal diseases, from 1930 to 1940*

Geographic section	Heart disease (all forms)[1]	Principal cardiovascular-renal diseases[1]
	Average annual percentage change from 1930 to 1940[2]	
New England	+1.55±.16	+ .04±.11
Middle Atlantic	+1.26±.11	− .39±.09
East North Central	+1.92±.17	+ .24±.15
West North Central	+1.74±.20	+ .24±.17
South Atlantic	+2.06±.24	+ 12±.18
East South Central	+3.02±.23	+1.04±.20
West South Central	+2.95±.22	+1.00±.23
Mountain	+2.47±.26	+ .66±.20
Pacific	+1.49±.17	+ .17±.11

[1] See appendix table, footnote 2.

[2] The average annual percentage change and probable error was computed as follows:

$y=a+bx$ where y is the logarithm of the rate
$B=(\text{antilog of } b)-1$ where B is the average annual percentage change in the rate

$$\sigma_b=\sqrt{\frac{\bar{\sigma}}{\Sigma(x-\bar{x})^2}}$$

where $\bar{\sigma}$ = square root of the sum of the squares of the differences between observed and calculated values of y divided by $n-2$ (i. e., 9), and where $\Sigma(x-\bar{x})^2$ = sum of squares of deviations of x from the mean of x.

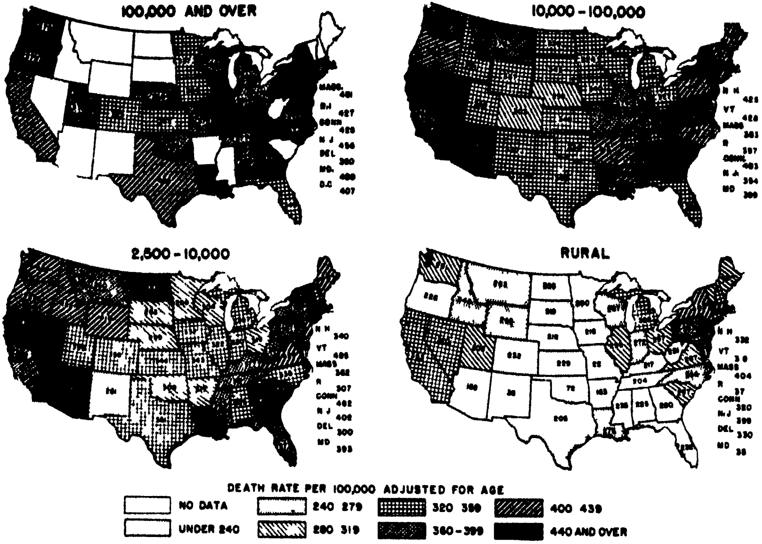
$$P.E._B=0.67449\,\frac{(1+B)\sigma_b}{0.4342945}$$

Mortality in States

Mortality in separate States specific for sex and population-size is found in the appendix table and the rates are shown in map form in figure 2. Three main facts are seen (1) men have a higher rate of mortality than women in every size-of-city group, (2) both urban and rural mortality from heart disease is slightly higher in North than South and in Eastern than Central sections, (3) recorded urban mortality is higher than rural among both men and women. Owing to the general agreement in mortality from heart disease over large sections of the country, as seen in figure 2, summary rates in 5 sections have been used (figs. 3 and 4) for a regional and an urban-rural comparison.

DISEASES OF THE HEART (ALL FORMS)

MALE



FEMALE

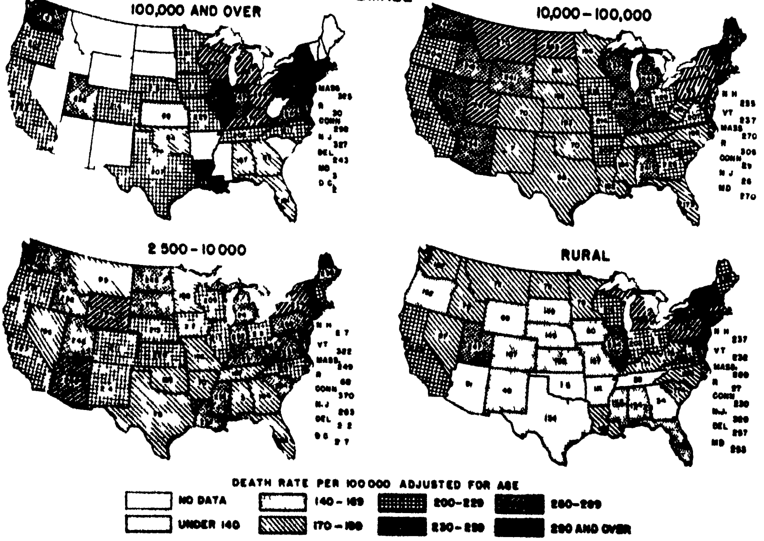


Figure 2. Distribution of mortality from diseases of the heart (all forms) by States—white resident, age-adjusted mortality, specific for sex and urban-rural areas of States, 1940.

Geographic Section

A North-South comparison of heart disease mortality is most advantageously made in the Eastern section (fig. 3). Among males in large cities and rural areas and among females in all population-size groups, heart disease mortality is somewhat higher in the North than in the South. The only variation from the general statement of higher mortality in North than South is the high rates among males in smaller cities and towns of the South. The reason for this increased mortality is obscure from these data. Although the differences between heart disease mortality rates in North and South are not excessive and show some irregularity, they nevertheless amount to a difference (North minus South) of approximately 35 percent in rural areas and of 8 and 30 percent, respectively, for males and females of large cities.

An East-Central comparison shows somewhat wider and more consistent differences, the higher rates being in the East (fig. 3). In rural areas of the North, heart disease mortality is approximately 45 percent higher in the East than in the Central section. The only exception to the statement of higher mortality in the East is the unusually high rate among males in large cities of the Central South. This rate, however, is based on a relatively small population; only four States including seven large cities comprise that area. Mortality from heart disease in the Pacific section falls, on the average, between that in the East and Central divisions.

A North-South comparison of the remaining two causes of death grouped as cardiovascular-renal diseases (fig. 3) is as follows: Mortality from intracranial lesions of vascular origin shows no marked geographic differences but is, on the whole, higher in the South than the North and slightly higher in the East than Central sections. Mortality from nephritis is definitely higher in the South than in the North in all population-size groups and tends also to be higher in the East than Central sections. Recorded mortality from both intracranial lesions of vascular origin and nephritis is small compared with that from heart disease; on the whole the above-named causes are opposite to heart disease in respect to a North-South and in the same direction in respect to an East-Central comparison.

It has been pointed out that practically all death certificates certifying both heart disease and intracranial lesions of vascular origin are allocated as heart disease deaths and that they form 8 percent of all recorded mortality from heart disease; death certificates certifying both heart disease and nephritis, however, are almost entirely allocated to nephritis and form 42 percent of the nephritis death rate. These percentages are for the country as a whole and are not available by geographic section. Even if 40 percent of the recorded nephritis death rate or a total of the rate involving primary nephritis and secondary heart disease mortality is added to the heart disease death rate in the

Table 4. *White resident mortality from the principal cardiovascular-renal diseases in urban-rural areas of geographic sections, 1940; age-adjusted death rate per 100,000* [1]

Geographic section	Both sexes				Male				Female			
	100,000 and over	10,000-100,000	2,500-10,000	Rural	100,000 and over	10,000-100,000	2,500-10,000	Rural	100,000 and over	10,000-100,000	2,500-10,000	Rural
	Diseases of the heart (all forms) [3]											
United States [2]	346.8	303.7	280.6	237.9	419.3	377.9	363.5	274.1	279.5	257.2	221.3	196.5
New England	375.5	324.2	315.1	283.6	445.0	389.6	388.7	332.6	315.4	266.6	248.1	232.9
Middle Atlantic	389.7	326.5	321.5	337.6	452.1	396.6	387.9	380.9	330.2	264.0	269.7	290.4
East North Central	343.8	292.8	266.9	255.0	408.5	351.7	327.0	289.8	280.6	238.2	211.6	214.9
West North Central	281.2	267.4	260.3	190.4	352.2	340.6	323.9	220.0	216.6	202.1	201.8	155.5
South Atlantic	318.3	294.0	297.7	223.2	405.2	398.1	304.9	262.3	243.7	206.1	212.2	181.1
East South Central	301.1	298.8	274.5	186.8	398.8	383.7	357.7	216.3	223.6	226.5	206.7	164.6
West South Central	326.3	273.2	266.3	167.6	427.9	358.5	351.6	197.1	237.1	194.6	186.7	132.8
Mountain	278.6	294.4	310.7	205.7	339.6	366.0	391.6	232.3	223.0	222.4	225.2	168.2
Pacific	303.3	298.6	311.1	265.0	394.0	394.6	401.9	311.9	220.8	214.6	222.5	203.2
	Intracranial lesions of vascular origin [3]											
United States [2]	77.6	91.6	94.7	85.7	78.8	95.3	100.6	87.1	76.3	88.5	89.7	84.0
New England	93.3	87.9	87.0	84.7	89.0	88.8	91.0	84.6	96.4	86.8	88.3	84.8
Middle Atlantic	68.1	85.4	82.4	90.3	66.9	83.1	78.4	88.5	69.0	87.3	85.7	92.2
East North Central	81.0	94.0	92.8	91.6	81.3	95.9	96.9	91.9	80.8	92.4	89.5	91.3
West North Central	79.6	93.0	97.5	77.6	82.8	95.7	103.5	79.4	76.8	89.8	92.1	75.4
South Atlantic	84.6	104.3	117.8	100.7	93.7	121.2	135.3	107.5	77.1	90.2	102.8	98.3
East South Central	93.4	113.4	103.8	88.4	99.5	130.6	120.1	92.9	87.9	100.0	98.4	88.3
West South Central	91.3	94.7	100.2	71.4	105.3	109.2	113.3	72.7	79.8	81.7	89.0	69.8
Mountain	72.0	89.9	100.9	64.6	70.4	98.6	110.2	61.5	73.1	86.2	90.7	68.9
Pacific	74.4	84.3	96.2	74.8	77.1	86.6	102.6	74.0	71.9	82.6	90.4	75.8

	Nephritis (all forms) [3]											
United States [1]	70.9	77.5	83.2	72.2	76.5	88.8	95.3	77.5	65.9	68.1	72.7	66.4
New England	66.9	67.2	70.7	60.8	72.3	72.4	80.3	63.9	62.6	63.1	62.5	57.7
Middle Atlantic	65.9	81.6	86.6	85.0	67.8	88.7	90.3	86.4	64.2	75.8	67.1	58.6
East North Central	75.6	72.8	74.4	71.6	78.6	80.9	84.1	75.4	73.0	65.7	66.0	67.4
West North Central	65.6	73.9	69.3	58.0	74.0	89.5	80.7	62.7	58.8	69.4	58.7	52.5
South Atlantic	102.6	109.2	119.6	102.2	117.5	134.3	149.8	113.3	90.9	82.7	88.6	90.4
East South Central	74.7	100.0	96.1	80.9	92.6	116.6	121.9	91.3	69.7	68.5	75.0	69.7
West South Central	82.9	82.3	93.9	66.9	98.1	100.4	112.6	73.6	79.3	69.0	75.6	56.7
Mountain	69.9	81.8	85.7	54.7	79.3	96.5	95.6	55.4	69.6	67.3	74.9	53.8
Pacific	60.8	66.7	80.5	55.4	69.1	78.6	92.7	58.5	58.8	58.7	69.0	51.4
	Cardiovascular-renal diseases [3]											
United States [1]	496.3	472.8	467 5	395.8	574.6	562.0	559.4	438.7	421.7	393.8	383.7	348.9
New England	537.4	481.8	476.4	437.2	612.6	554.2	559.4	485.3	477.2	428.5	406.2	369.6
Middle Atlantic	523.8	495.4	493.0	516.4	596.2	573.0	558.8	558.8	460.5	426.9	437.3	471.8
East North Central	500.0	460.5	437.3	427.0	576.2	529.1	507 3	462.7	431.0	400.9	376.5	355.2
West North Central	427.4	437.2	432.9	332.5	510.7	526.9	511.0	367.7	355.3	350.6	361.2	291.1
South Atlantic	506.5	509.6	537 6	426.0	625 8	664.6	686.5	483.2	412.1	383.3	410.3	365.6
East South Central	471.0	514.0	475.7	357.0	596.3	637.8	602.1	401.6	371.7	414.0	372.2	308.4
West South Central	500.9	451.1	461.2	305.1	640.4	575.5	578.4	344.6	385.4	339.8	352.2	268.5
Mountain	421.7	466.7	498.8	324.4	479.9	558.0	597.7	349.6	370.5	376.3	392.0	289.2
Pacific	439.8	452.7	489.3	396.1	544.8	560.8	596.9	446.3	350.3	362.4	396.9	330.5

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[1] Age-adjusted rates for diseases of the heart (all forms) and for intracranial lesions of vascular origin were obtained by the direct method of adjustment (*2*, pp. 274-276). Age-adjusted rates for nephritis and for the total of cardiovascular-renal diseases were obtained by the indirect method of adjustment (*2*, pp. 270-274). Rates are adjusted to the age distribution of the total population as enumerated in 1940.

[2] See appendix table, footnote 2.

[3] From Vital Statistics, Special Reports, vol. 23, No. 1, 1945.

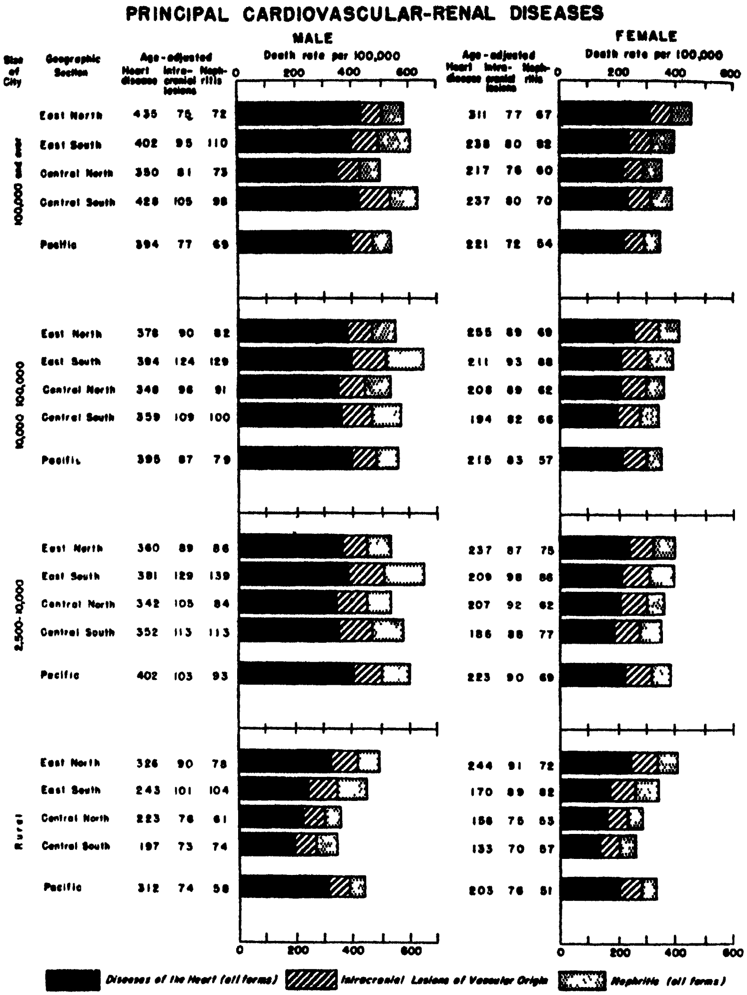

Figure 3. Regional comparison of mortality from diseases of the heart (all forms) and from other major cardiovascular-renal diseases—white resident, age-adjusted mortality, specific for sex, population-size, and geographic section, 1940.

several geographic sections (as can be done from the rates given in fig. 3), both the North-South and East-Central relationships observed for recorded heart disease mortality still persist; namely, somewhat higher rates in North than South and in East than Central sections.

With this general presentation of heart disease mortality in mind, the question next arises whether rates for cities of the same size may vary not only with respect to section of the country, but also according to other obviously related characteristics such as industrialization or income.

Some measure of industrialization in cities can be obtained from tabulations made by the Bureau of the Census of the number of persons employed in specific industries. The percentage of males 14 years and over employed in mining and manufacturing can be used as a rough index of industrialization and is shown in the following table for cities of three population-size groups, in five geographic sections:

Geographic section	*Cities of 2,500-10,000 population*	*Cities of 10,000-100,000 population*	*Cities of 100,000 and over population*
	Percent	*Percent*	*Percent*
East North	24. 3	29 7	23. 9
East South	20. 8	19. 9	18. 3
Central North	11. 6	14. 7	17. 4
Central South	13. 3	13. 3	14. 6
Pacific	15. 7	16. 9	14. 2

From Census of Population, 1940.

According to this rather crude index the extent of industrialization is greatest in the East North region; in both Eastern and Central sections it is usually slightly higher in the North; in both North and South it is markedly higher in the East. The index for the Pacific tends to fall between that for the East and Central sections. It appears, therefore, that the degree of industrialization among cities of the same size varies with section of the country and that the broad regional distribution of industrialization is in general similar to that of mortality from heart disease. It may be true, therefore, that industrialization, as measured by the percentage employed in manufacture and obviously related variables such as income and medical and hospital facilities, is correlated with heart disease mortality when population-size is held constant. This association because of an interrelationship with latitude may account for the slight observed association of mortality from all forms of heart disease with latitude as shown in variation with geographic section.

Heart disease is the only one of the three old-age causes of death dealt with here that shows the same broad regional distribution observed for industrialization.

Population-size

Recorded mortality from diseases of the heart decreases in general with a descending order of population-size (fig. 4); the difference between cities and rural areas is clearly marked, but among cities of varying size the differences are of a slight amount only and are not entirely consistent throughout.

In the Eastern section of the country rural mortality is lower than an average of urban, the percentage difference of urban minus rural mortality being greater in the South. The question arises as to how

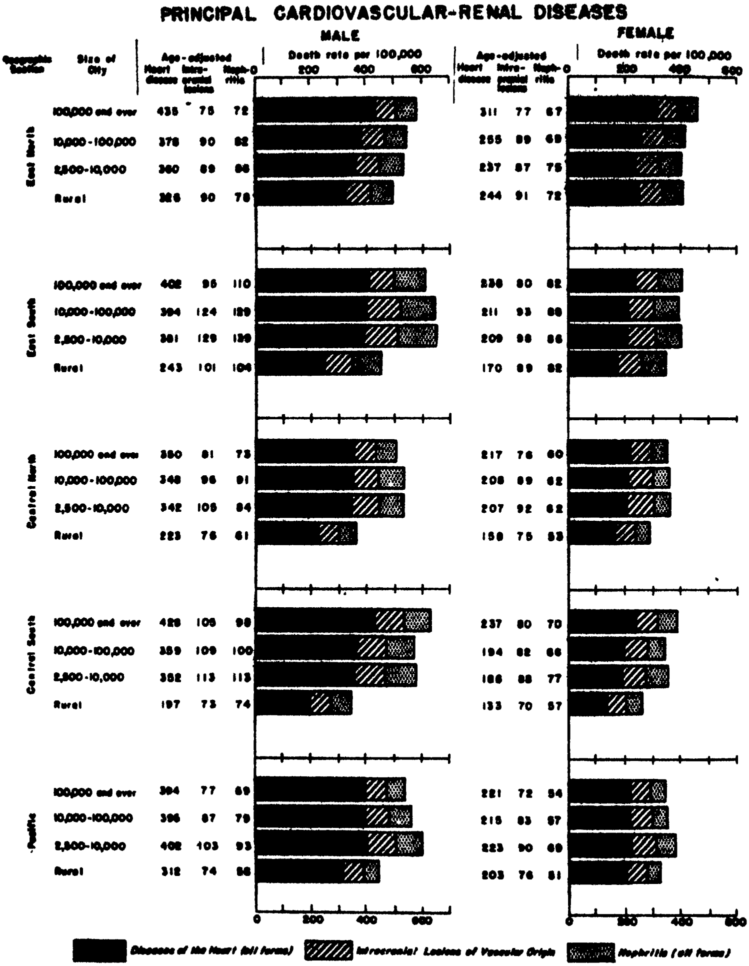

Figure 4. Urban-rural comparison of mortality from diseases of the heart (all forms) and from other major cardiovascular-renal diseases—white resident, age-adjusted mortality, specific for sex, population-size, and geographic section, 1940.

much of this difference occasioned by low rural mortality can be caused by inaccuracy of reporting cause of death in rural areas. As a first approximation to an answer we have added to age-adjusted heart disease mortality the combined rate assigned to old-age and ill-defined and unknown causes (age-adjusted) specific for geographic section and size of city, and find that these ill-defined rates are small compared with mortality from heart disease and that therefore their inclusion with heart disease does not alter any general conclusions.

Approximately half of the total deaths tabulated as ill-defined causes cannot be due to heart disease or an associated old-age cause of death since about that proportion of deaths allocated to ill-defined causes occurs at ages under 45 years. White mortality from ill-defined causes and from senility in the East North section is negligible in both cities and rural areas; in the East South section half the ill-defined rate is approximately 8 per 100,000 in cities and 15 per 100,000 in rural areas, and the senility rate is approximately 9 and 14 per 100,000 in cities and rural areas, respectively. If these old-age rates are added to heart disease mortality for both sexes, the percentage difference between urban and rural rates in North and South (East) is approximately 15 and 35 percent, respectively.

Mortality from both intracranial lesions of vascular origin and nephritis increases, insofar as city rates are concerned, as size of city decreases; the rates in rural areas, however, are the same as in small

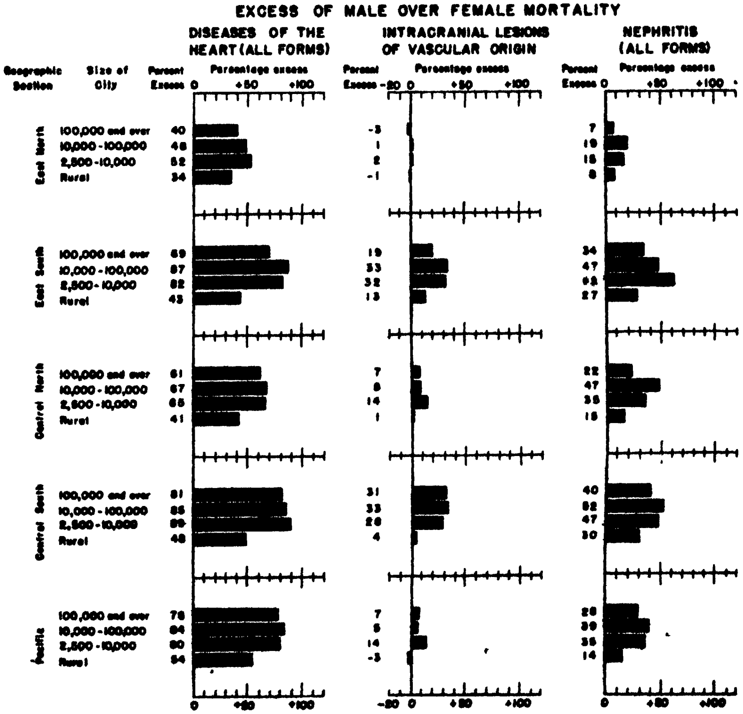

Figure 5. Excess of male over female mortality from diseases of the heart (all forms) and from other major cardiovascular-renal diseases—white resident, age-adjusted rates, specific for sex, population-size, and geographic section, 1940.

cities or show a decrease, and in some cases are lower even than in cities of 100,000 population and over (fig. 4).

Male-Female Comparison

The percentage excess of male heart disease mortality over female (fig. 5) is higher in cities than in rural areas; and is also higher in the South than the North for all sizes of city and rural areas. Sex ratios of mortality from intracranial lesions of vascular origin and from nephritis show the same relationships with size of city and geographic section as heart disease, but with a considerably smaller male percentage excess.

Summary

Resident age-adjusted mortality from all forms of heart disease specific for sex, race, geographic section and population-size is considered in this study. Numbers of deaths are from available tabulations of the National Office of Vital Statistics, supplemented by a special tabulation. A later study will present the tabulated subdivisions of heart disease specific for the same variables. In this greater detail of diagnosis the rates permit further analysis. The broader aspects of mortality from all forms of heart disease, however, are dealt with here and are as follows:

Age-adjusted resident mortality from diseases of the heart (all forms) specific for geographic section and population-size is (1) markedly higher for men than women, (2) slightly higher in North than South and in East than Central sections, and (3) higher in cities than in rural areas. The observed association of heart disease mortality and geographic section may conceivably be due to a secondary association with industrialization including such associated variables as income, and medical and hospital facilities.

Age-adjusted rates for heart disease and other cardiovascular-renal diseases in separate States are included in the appendix table.

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Appendix

White resident mortality from the principal cardiovascular. renal diseases in urban-rural areas of States, 1940; age-adjusted death rate per 100,000 [1]

State and size of city	Diseases of the heart (all forms) [2]			Intracranial lesions of vascular origin [3]			Nephritis [4]			Cardiovascular-renal diseases [5]		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Alabama:												
100,000 and over	277.8	386.1	187.5	87.8	99.5	78.0	91.2	122.3	64.9	456.8	613.2	330.3
10,000-100,000	333.0	449.2	241.4	120.1	164.2	86.1	113.9	130.2	100.9	504.3	739.1	426.4
2,500-10,000	242.7	325.5	172.6	96.4	90.9	100.9	116.1	153.4	84.8	455.2	570.1	358.2
Rural	190.7	224.8	154.5	91.0	95.1	86.5	102.8	117.7	87.0	383.8	437.1	327.3
Arizona:												
100,000 and over	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
10,000-100,000	406.8	566.1	253.7	135.2	159.1	113.7	101.9	130.9	74.5	634.3	835.6	439.9
2,500-10,000	425.2	552.2	289.0	99.5	111.2	87.5	109.8	116.0	102.8	634.7	779.4	479.1
Rural	135.6	168.0	90.5	37.9	38.8	36.7	39.9	41.7	37.4	212.5	248.1	162.9
Arkansas:												
100,000 and over	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
10,000-100,000	304.7	412.5	208.5	97.3	112.8	83.2	110.5	143.6	80.4	511.1	670.6	369.2
2,500-10,000	239.7	317.3	169.9	110.2	123.3	98.1	99.0	120.0	80.1	447.5	558.9	346.7
Rural	139.2	162.9	111.0	71.0	73.5	68.0	67.9	80.7	52.7	277.8	316.8	231.4
California:												
100,000 and over	306.5	408.1	223.1	70.1	73.3	67.5	56.0	66.1	48.5	432.1	546.1	338.9
10,000-100,000	299.5	398.3	220.4	79.0	82.1	76.5	58.1	68.4	49.9	436.2	548.2	346.7
2,500-10,000	307.8	395.6	227.8	90.3	96.4	85.7	69.6	81.5	58.8	467.8	572.6	372.0
Rural	298.5	353.4	228.7	73.1	72.1	74.4	52.1	55.2	48.2	423.4	480.6	350.9
Colorado:												
100,000 and over	266.2	325.0	214.2	75.5	74.5	76.4	77.9	79.3	76.7	418.9	477.6	367.0
10,000-100,000	233.1	303.0	170.3	79.2	88.9	70.5	76.1	92.9	60.9	388.2	483.7	301.9
2,500-10,000	286.2	359.4	211.5	92.5	97.1	87.8	76.8	89.4	64.3	453.3	544.1	361.0
Rural	203.8	231.9	166.9	71.6	66.4	78.6	66.7	69.3	63.3	341.5	367.3	307.8
Connecticut:												
100,000 and over	357.9	428.0	297.7	85.4	86.8	84.3	63.0	73.2	54.2	505.4	587.5	435.0
10,000-100,000	342.9	402.9	290.5	94.6	91.6	97.2	74.2	74.9	73.5	510.9	569.1	460.5
2,500-10,000	420.3	482.1	369.9	140.2	128.2	150.4	81.5	104.2	64.5	638.0	710.0	579.6
Rural	278.7	319.6	230.3	66.6	69.9	67.3	51.3	59.7	43.4	398.2	449.0	340.7
Delaware:												
100,000 and over	291.6	350.2	243.2	97.7	110.0	87.4	115.1	115.9	114.5	502.5	573.3	444.0
10,000-100,000	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
2,500-10,000	251.7	300.0	211.6	80.0	83.4	77.0	120.7	155.7	93.2	465.0	558.0	388.6
Rural	294.1	330.2	256.6	88.6	89.4	87.8	96.9	102.7	90.9	475.7	519.0	430.9
District of Columbia:												
100,000 and over	293.3	406.7	210.5	79.5	89.5	72.2	99.2	115.7	87.1	472.1	612.9	369.5
Florida:												
100,000 and over	262.7	348.7	180.9	82.3	94.0	71.3	80.3	97.6	64.2	425.1	538.9	316.8
10,000-100,000	246.9	330.6	173.4	86.2	105.6	69.4	75.7	92.3	60.9	408.1	527.9	303.2
2,500-10,000	274.5	372.5	182.8	106.2	118.0	95.0	92.1	119.1	66.0	471.9	607.0	343.6
Rural	194.8	232.1	150.3	86.4	92.5	79.1	74.6	80.9	67.0	355.6	405.1	296.4
Georgia:												
100,000 and over	291.9	440.9	183.4	97.0	119.8	80.6	124.1	160.2	97.8	511.3	715.1	362.1
10,000-100,000	339.9	488.8	226.0	110.5	144.0	85.2	136.0	177.9	103.7	587.7	811.2	416.2
2,500-10,000	299.1	446.3	188.8	125.0	161.7	96.2	145.0	182.6	115.2	570.9	791.0	397.1
Rural	177.0	219.9	133.7	103.3	120.0	86.4	114.3	132.2	96.3	394.3	471.2	316.5
Idaho:												
100,000 and over	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
10,000-100,000	281.9	320.7	240.8	114.4	104.2	125.3	100.0	121.3	77.5	492.9	541.6	441.2
2,500-10,000	339.4	434.7	236.4	122.2	151.6	90.9	90.1	95.6	84.4	553.5	690.6	409.5
Rural	219.9	247.7	178.7	62.7	54.6	74.8	53.6	53.8	53.3	337.4	356.9	308.3
Illinois:												
100,000 and over	392.6	481.8	309.9	70.3	71.0	69.7	93.5	93.0	94.0	556.3	646.1	473.3
10,000-100,000	313.3	375.8	259.5	84.0	88.1	80.4	81.9	93.9	71.7	478.7	557.5	411.2
2,500-10,000	263.9	322.1	213.3	80.3	84.7	76.4	79.0	88.2	71.0	423.0	495.3	360.4
Rural	268.0	299.0	233.5	86.5	82.7	90.7	84.1	87.9	79.9	438.4	469.3	404.1
Indiana:												
100,000 and over	313.7	390.8	246.5	88.3	92.3	84.9	101.5	104.0	99.3	503.1	587.3	430.1
10,000-100,000	298.8	362.6	241.1	109.6	114.0	105.7	95.5	102.4	89.3	503.7	578.7	436.1
2,500-10,000	277.6	330.4	231.8	106.9	111.7	102.8	105.8	126.1	88.2	489.6	567.5	422.2
Rural	239.0	271.5	203.4	95.4	95.7	95.1	88.7	96.4	81.4	423.1	462.6	379.7
Iowa:												
100,000 and over	262.2	323.9	210.7	96.2	99.9	93.1	53.0	71.2	38.1	411.8	498.5	343.1
10,000-100,000	274.5	340.0	217.9	100.7	93.6	106.9	70.6	80.3	62.0	445.8	514.1	386.9
2,500-10,000	268.4	332.4	212.3	101.4	108.1	95.7	55.9	61.8	50.8	426.2	503.0	359.2
Rural	190.6	218.6	160.3	79.3	81.1	77.3	46.9	49.1	44.6	316.9	348.6	282.0
Kansas:												
100,000 and over	241.9	282.3	168.9	97.4	104.5	90.9	74.2	80.6	68.7	412.9	507.4	327.7
10,000-100,000	264.0	346.5	198.1	87.5	94.4	81.7	85.8	105.8	69.3	437.1	550.2	343.5
2,500-10,000	277.6	344.3	219.8	100.7	104.8	97.5	86.6	99.0	75.7	464.6	548.6	391.9
Rural	196.0	229.5	158.0	78.9	78.4	79.6	66.2	73.5	57.8	341.1	381.1	296.6

See footnotes at end of table.

White resident mortality from the principal cardiovascular-renal diseases in urban-rural areas of States, 1940; age-adjusted death rate per 100,000 [1]**—Continued**

State and size of city	Diseases of the heart (all forms) [2]			Intracranial lesions of vascular origin [3]			Nephritis [4]			Cardiovascular-renal diseases [5]		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Kentucky:												
100,000 and over	348.3	450.3	270.0	84.1	87.8	81.3	85.7	98.9	75.4	515.7	633.7	425.0
10,000-100,000	302.7	365.3	253.0	114.5	122.6	108.0	80.8	92.5	71.4	496.4	578.3	431.1
2,500-10,000	297.0	377.2	230.9	120.9	143.5	102.5	85.0	113.1	61.8	502.6	633.9	394.9
Rural	195.1	216.8	170.7	90.6	92.4	88.6	66.2	76.4	59.1	353.5	385.1	318.1
Louisiana:												
100,000 and over	429.4	566.4	331.9	82.9	113.1	61.5	117.8	131.8	108.0	629.9	813.8	500.2
10,000-100,000	317.0	476.7	181.9	80.4	98.0	65.2	97.8	131.4	68.4	493.3	704.4	313.4
2,500-10,000	370.0	507.7	252.1	86.5	94.8	79.5	116.5	126.8	107.7	574.1	727.5	442.5
Rural	233.5	275.8	186.2	67.8	66.1	69.8	73.3	77.4	68.8	374.1	419.0	324.0
Maine:												
100,000 and over	----	----	----	----	----	----	----	----	----	----	----	----
10,000-100,000	314.7	401.9	245.0	100.7	113.2	90.9	86.1	89.5	83.3	500.6	603.7	418.4
2,500-10,000	314.7	404.2	238.3	88.3	108.4	71.5	84.2	85.4	83.2	486.3	598.2	391.8
Rural	262.5	293.7	229.4	100.4	102.5	98.3	62.0	63.5	60.4	425.2	460.0	388.2
Maryland:												
100,000 and over	377.3	460.5	311.4	79.2	82.0	77.1	110.2	123.5	99.7	565.7	665.8	486.8
10,000-100,000	329.3	398.8	270.3	99.3	112.5	88.1	115.5	137.0	97.0	539.7	646.1	449.9
2,500-10,000	294.0	393.4	217.5	82.1	84.2	80.6	137.9	173.2	110.5	520.0	659.9	412.5
Rural	301.7	351.5	252.5	98.1	101.4	94.9	104.4	113.8	95.1	503.9	565.2	443.1
Massachusetts:												
100,000 and over	385.0	460.5	325.3	96.1	89.8	100.9	64.1	67.5	61.4	544.8	617.4	487.6
10,000-100,000	319.8	383.0	269.9	84.8	83.1	86.1	57.8	62.6	54.1	462.1	528.7	409.8
2,500-10,000	301.6	361.9	249.1	78.0	72.3	82.9	67.1	72.8	62.2	446.8	507.9	393.8
Rural	339.2	408.5	279.5	91.4	86.5	96.0	61.9	63.9	60.1	492.7	553.2	436.4
Michigan:												
100,000 and over	322.9	387.8	261.3	81.4	76.6	85.9	57.0	59.7	54.5	461.1	524.7	400.9
10,000-100,000	296.7	358.1	241.7	98.0	94.9	100.7	61.7	68.8	55.3	456.0	521.8	397.2
2,500-10,000	297.6	357.1	244.0	100.3	102.4	98.4	51.8	60.8	43.7	449.5	519.6	386.2
Rural	297.9	327.7	261.8	95.9	96.1	95.7	55.9	58.0	53.3	449.3	481.3	410.6
Minnesota:												
100,000 and over	275.7	336.5	220.8	80.3	79.5	81.1	28.4	31.9	25.2	384.0	448.0	326.4
10,000-100,000	257.8	323.9	196.0	116.5	120.3	113.0	51.3	60.1	43.1	422.7	499.1	350.7
2,500-10,000	253.8	287.7	198.4	92.9	97.4	88.2	48.8	60.3	36.8	385.0	444.5	323.3
Rural	207.4	229.8	178.5	78.9	79.3	78.5	38.1	39.5	36.3	324.1	348.3	293.7
Mississippi:												
100,000 and over	----	----	----	----	----	----	----	----	----	----	----	----
10,000-100,000	281.1	402.0	184.0	110.2	113.7	107.5	120.8	156.4	92.2	512.9	673.6	384.3
2,500-10,000	290.2	363.1	232.4	67.0	85.4	52.9	136.7	163.1	116.2	492.8	606.1	402.7
Rural	196.5	234.8	155.2	88.0	97.3	78.0	95.9	105.1	86.1	380.1	437.0	318.8
Missouri:												
100,000 and over	297.0	378.6	229.2	72.4	77.3	68.3	98.1	112.6	86.1	467.0	568.3	383.2
10,000-100,000	279.4	359.7	213.6	84.2	89.7	79.7	90.4	116.2	69.4	453.9	564.6	363.1
2,500-10,000	262.7	343.3	198.3	91.5	95.8	87.8	102.3	123.8	83.7	456.5	562.1	365.1
Rural	193.9	226.5	157.2	79.9	82.0	77.6	79.6	88.0	70.2	353.3	396.3	305.0
Montana:												
100,000 and over	----	----	----	----	----	----	----	----	----	----	----	----
10,000-100,000	327.1	379.5	269.9	86.6	77.2	97.0	61.1	60.4	61.9	475.9	519.2	428.8
2,500-10,000	285.1	360.4	199.5	97.3	102.9	90.9	66.5	74.3	57.9	445.1	532.8	345.5
Rural	227.6	262.8	172.5	77.2	76.2	78.8	46.8	47.8	45.2	350.8	386.1	295.3
Nebraska:												
100,000 and over	285.5	359.6	218.3	90.5	90.0	90.9	51.0	51.9	50.1	424.0	497.4	358.0
10,000-100,000	237.4	296.6	183.4	87.2	99.0	77.0	70.8	95.5	49.1	396.0	495.5	309.1
2,500-10,000	254.7	299.3	212.7	107.0	128.4	87.3	54.8	57.5	52.2	418.1	483.8	355.7
Rural	182.8	211.5	149.0	85.2	90.1	79.3	57.6	63.9	50.1	325.4	365.4	278.3
Nevada:												
100,000 and over	----	----	----	----	----	----	----	----	----	----	----	----
10,000-100,000	375.5	482.3	243.8	72.8	99.2	40.4	76.7	65.2	93.2	527.6	649.4	374.0
2,500-10,000	441.6	603.4	195.0	133.4	151.6	106.1	110.7	122.3	95.1	662.0	848.0	383.0
Rural	273.1	319.6	186.6	61.2	62.5	58.9	51.4	51.6	51.0	386.6	437.5	293.2
New Hampshire:												
100,000 and over	----	----	----	----	----	----	----	----	----	----	----	----
10,000-100,000	330.5	425.4	255.0	89.6	87.8	91.0	74.2	84.7	65.7	493.2	559.0	409.7
2,500-10,000	273.9	340.1	217.0	57.9	72.8	45.5	31.2	33.4	29.3	358.3	443.2	286.4
Rural	285.5	332.2	237.2	78.1	81.7	74.4	71.3	77.1	65.4	434.5	490.1	376.9
New Jersey:												
100,000 and over	388.7	456.3	327.4	95.0	91.7	97.9	70.1	74.8	65.9	553.2	622.4	490.7
10,000-100,000	321.8	394.4	261.0	81.6	77.2	85.2	70.1	76.1	65.2	473.1	547.8	410.9
2,500-10,000	326.9	401.6	263.3	77.6	68.4	85.5	78.9	80.8	77.0	483.1	550.6	425.7
Rural	359.7	399.1	320.0	94.2	93.3	95.1	87.3	89.0	85.7	540.4	580.1	500.6
New Mexico:												
100,000 and over	----	----	----	----	----	----	----	----	----	----	----	----
10,000-100,000	248.8	330.4	170.9	87.3	105.5	69.1	122.3	145.3	99.2	449.7	571.8	331.2
2,500-10,000	288.2	361.4	213.7	109.5	108.9	115.4	106.0	116.0	95.1	444.3	474.3	412.6
Rural	139.1	138.1	140.3	42.7	41.0	44.9	48.0	42.5	54.0	229.7	222.4	239.6

See footnotes at end of table.

White resident mortality from the principal cardiovascular-renal diseases in urban-rural areas of States, 1940; age-adjusted death rate per 100,000 [1]—Continued

State and size of city	Diseases of the heart (all forms) [2]			Intracranial lesions of vascular origin [3]			Nephritis [4]			Cardiovascular-renal diseases [5]		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
New York:												
100,000 and over	393.3	464.0	330.5	60.4	58.5	62.1	55.6	58.6	52.9	509.2	581.5	445.3
10,000-100,000	327.0	397.7	269.7	86.0	84.0	87.5	73.7	79.0	69.4	486.0	560.0	426.2
2,500-10,000	325.9	388.9	274.4	89.4	83.2	94.4	77.1	76.3	77.8	492.1	548.3	446.2
Rural	353.6	403.2	302.3	86.6	80.9	92.4	73.6	74.7	72.4	513.3	558.3	466.8
North Carolina:												
100,000 and over	334.0	477.3	217.3	115.5	125.1	108.3	74.7	91.7	61.1	523.2	702.8	382.0
100,000-100,000	292.9	413.7	198.2	119.2	141.1	102.4	124.9	144.2	109.9	537.1	697.9	411.2
2,500-10,000	264.6	335.1	207.1	123.7	141.1	110.0	128.7	175.5	90.3	517.2	651.0	408.2
Rural	219.3	258.3	179.6	113.2	123.4	102.9	117.3	128.3	106.3	449.2	509.3	387.9
North Dakota:												
100,000 and over	------	------	------	------	------	------	------	------	------	------	------	------
10,000-100,000	302.0	338.6	265.4	77.0	93.7	59.7	52.1	48.9	55.2	429.8	481.3	378.5
2,500-10,000	356.0	461.0	246.1	139.9	138.6	141.5	55.2	63.4	45.9	544.4	664.3	418.5
Rural	206.1	226.1	179.0	76.2	80.8	69.9	53.6	56.4	49.9	335.3	363.0	297.8
Ohio:												
100,000 and over	311.5	370.1	259.9	90.4	90.8	90.1	63.4	69.8	57.8	464.9	530.4	407.4
10,000-100,000	273.6	327.1	228.8	100.7	102.6	99.0	65.9	72.3	60.6	439.9	501.3	388.5
2,500-10,000	260.9	318.7	212.3	102.4	105.2	100.0	74.6	80.2	69.9	437.5	503.9	381.8
Rural	258.1	296.6	215.4	99.9	103.0	96.4	71.9	76.6	66.7	429.9	476.2	378.5
Oklahoma:												
100,000 and over	281.8	386.3	184.1	96.4	121.8	73.0	67.7	81.5	54.8	446.1	590.7	312.0
10,000-100,000	249.5	333.9	170.5	115.2	136.4	90.9	80.4	88.6	72.5	442.0	556.9	333.7
2,500-10,000	240.8	300.4	181.8	120.5	132.5	108.4	86.7	99.1	74.7	448.1	534.2	363.2
Rural	147.0	172.1	115.4	73.6	77.2	69.0	62.3	66.7	56.8	282.5	315.6	241.1
Oregon:												
100,000 and over	282.8	372.0	202.5	81.7	81.1	82.2	97.0	98.7	95.5	461.1	551.8	379.7
10,000-100,000	304.2	404.5	204.4	128.8	124.6	133.1	167.3	202.1	133.1	599.7	730.3	470.0
2,500-10,000	323.7	426.5	220.6	109.5	119.7	99.1	124.9	144.2	106.0	560.4	691.7	428.4
Rural	194.3	225.5	151.9	70.1	66.9	74.3	69.7	72.9	65.3	333.6	364.6	291.5
Pennsylvania:												
100,000 and over	381.3	454.3	319.7	79.8	82.6	77.4	93.5	91.9	94.9	554.1	628.5	491.4
10,000-100,000	330.1	410.1	261.1	87.8	85.8	89.5	95.9	104.7	88.4	513.2	600.1	438.5
2,500-10,000	317.8	386.7	258.2	80.7	79.4	81.8	100.2	108.1	97.7	498.2	568.8	437.8
Rural	324.6	362.9	283.1	94.3	95.8	92.7	94.7	96.0	93.3	518.0	553.8	466.7
Rhode Island:												
100,000 and over	357.1	427.0	301.0	93.1	95.0	91.6	92.9	108.2	84.8	543.1	625.5	477.4
10,000-100,000	346.5	396.5	304.9	92.0	101.8	83.9	89.9	100.0	81.5	527.8	596.3	470.7
2,500-10,000	232.7	306.8	168.1	94.4	115.8	78.8	81.5	88.9	75.3	404.8	501.3	322.4
Rural	320.9	371.1	271.1	97.6	93.7	101.3	80.2	70.3	89.4	501.6	536.1	467.7
South Carolina:												
100,000 and over	------	------	------	------	------	------	------	------	------	------	------	------
10,000-100,000	334.6	506.3	206.0	131.0	148.0	118.1	155.6	206.4	117.8	621.5	864.9	440.1
2,500-10,000	341.5	482.9	233.6	145.5	179.1	120.6	147.2	196.7	108.0	631.6	858.1	458.7
Rural	236.0	297.5	174.1	119.0	135.4	102.7	118.3	135.0	101.6	472.5	566.7	377.9
South Dakota:												
100,000 and over	------	------	------	------	------	------	------	------	------	------	------	------
10,000-100,000	270.6	344.5	198.2	101.4	120.0	83.5	40.8	52.4	29.7	412.7	512.9	313.8
2,500-10,000	260.2	292.5	229.6	121.3	107.2	134.9	75.0	105.3	47.0	455.4	504.9	408.8
Rural	188.2	219.3	149.1	73.6	75.8	71.0	45.9	50.3	40.3	307.5	345.2	260.2
Tennessee:												
100,000 and over	279.8	377.2	202.1	103.1	112.4	95.7	61.9	78.3	49.1	443.4	565.3	346.3
10,000-100,000	247.2	333.6	169.6	113.7	130.8	98.5	100.9	104.0	98.3	459.8	560.8	368.5
2,500-10,000	262.4	361.2	182.1	110.6	135.6	90.9	73.0	87.4	61.1	445.0	581.3	334.2
Rural	172.8	204.3	139.0	85.3	91.8	78.3	73.8	84.6	62.3	331.7	380.5	279.4
Texas:												
100,000 and over	298.7	405.6	207.5	92.8	95.5	90.5	73.0	91.0	57.7	463.6	590.7	355.1
10,000-100,000	269.0	348.9	198.1	90.4	99.7	82.2	73.8	89.2	60.0	432.9	538.2	339.7
2,500-10,000	262.2	351.3	179.4	93.7	107.3	81.1	90.7	113.5	69.4	446.4	572.2	329.5
Rural	172.4	205.4	134.2	71.9	72.8	70.9	65.0	73.5	55.2	309.1	351.4	260.0
Utah:												
100,000 and over	313.3	377.6	257.6	68.6	63.7	72.8	48.6	45.9	51.0	429.1	485.9	380.0
10,000-100,000	310.5	356.6	267.0	60.6	45.5	73.9	68.2	87.8	50.6	438.2	496.9	386.6
2,500-10,000	302.1	359.3	244.8	86.0	87.7	84.2	65.5	75.2	55.4	447.6	511.8	381.6
Rural	276.5	303.5	246.6	74.2	67.7	81.3	60.7	62.6	58.8	409.9	433.1	384.5
Vermont:												
100,000 and over	------	------	------	------	------	------	------	------	------	------	------	------
10,000-100,000	315.9	427.6	236.7	77.1	98.5	62.4	75.3	85.2	67.9	463.5	601.6	364.6
2,500-10,000	393.9	484.9	321.8	126.9	148.8	110.0	85.2	126.5	53.6	596.1	747.7	477.4
Rural	275.7	318.2	231.6	93.1	87.3	99.2	60.4	58.1	62.8	428.9	463.8	392.9
Virginia:												
100,000 and over	307.8	390.1	245.4	99.9	117.6	86.8	102.6	109.0	97.7	509.4	613.9	430.1
10,000-100,000	309.3	440.4	207.5	104.6	124.0	89.7	103.4	135.6	78.4	518.6	702.9	376.3
2,500-10,000	327.7	428.8	237.9	123.1	137.2	110.3	112.5	118.3	107.3	567.6	691.7	457.6
Rural	246.7	287.0	204.4	99.9	102.6	97.1	100.4	113.4	86.8	446.8	503.0	357.8

See footnotes at end of table

White resident mortality from the principal cardiovascular-renal diseases in urban-rural areas of States, 1940: age-adjusted death rate per 100,000 [1]*—Continued*

State and size of city	Diseases of the heart (all forms) [2]			Intracranial lesions of vascular origin [2]			Nephritis [2]			Cardiovascular-renal diseases [2]		
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Washington:												
100,000 and over	309.4	375.7	242.7	89.9	89.1	90.7	63.9	70.6	57.1	463.3	535.8	390.6
10,000-100,000	309.0	374.9	239.7	111.8	101.0	123.0	77.7	82.8	72.9	497.1	556.4	434.8
2,500-10,000	319.9	401.5	232.8	110.4	114.4	106.1	77.0	80.1	73.8	504.6	590.8	411.7
Rural	244.7	291.0	181.7	82.0	83.6	79.9	52.8	55.6	49.0	379.8	430.2	311.0
West Virginia:												
100,000 and over	---	---	---	---	---	---	---	---	---	---	---	---
10,000-100,000	279.4	371.9	199.3	101.0	107.2	95.6	96.2	113.6	80.9	476.6	592.0	376.4
2,500-10,000	318.8	390.1	252.7	133.6	151.6	117.2	104.0	132.1	78.6	553.5	668.8	446.8
Rural	199.4	220.7	174.5	86.2	85.2	87.4	77.7	85.5	68.5	362.8	390.8	329.9
Wisconsin:												
100,000 and over	309.5	365.6	260.3	84.5	87.2	82.1	50.0	57.4	43.4	443.7	509.9	385.6
10,000-100,000	280.0	332.6	233.0	84.0	81.5	86.2	56.3	62.4	50.7	420.1	476.4	369.8
2,500-10,000	254.2	303.5	209.1	86.9	92.7	81.6	55.1	64.8	46.3	395.1	459.3	336.6
Rural	244.1	267.2	215.9	87.6	88.7	86.2	51.2	53.7	48.2	382.6	409.4	350.1
Wyoming:												
100,000 and over	---	---	---	---	---	---	---	---	---	---	---	---
10,000-100,000	301.9	356.8	241.1	85.0	102.3	66.1	66.4	77.8	54.3	448.1	537.7	352.6
2,500-10,000	346.1	409.6	264.2	144.7	167.9	111.2	107.3	126.0	81.5	577.3	693.9	428.5
Rural	216.3	247.6	168.9	66.7	77.0	51.7	57.1	59.8	53.0	339.5	382.1	274.9

[1] Adjusted for age by the indirect method (see Pearl, Raymond, Medical Biometry and Statistics, ed. 3, pp. 270-274) to the total population of the United States, enumerated 1940. All crude and age-specific rates are based on the enumerated population, 1940. The rates for a total of the principal cardiovascular-renal diseases were adjusted separately; they are not the sums of the adjusted rates for the three specified causes of death.

[2] Principal cardiovascular-renal diseases:

	International List Code Numbers			
	1910	*1921*	*1930*	*1939*
Diseases of the heart (all forms)	77-80	87-90	90-95	90-95
Intracranial lesions of vascular origin	64-66, 82	74, 75, 83	82	83
Nephritis (all forms)	119, 120	128, 129	130-132	130-132

Raffinose Serum Tellurite Agar Slants as a Replacement for Loeffler's Medium in Diphtheria Diagnosis

By Ona R. Whitley, M. S., and Samuel R. Damon, Ph. D.*

Routine diagnosis of diphtheria is probably based on microscopic examination of stained smears made from nose and throat cultures grown on Loeffler's coagulated blood serum slants in the great majority of laboratories. The general use of this medium stems from its introduction by Loeffler (*1*) as a satisfactory base upon which to grow *Corynebacterium diphtheriae*, the belief that it possesses certain peculiar growth-promoting properties for the organism, that it is to some degree, at least, selective in its action, and that on it the organism exhibits characteristic cellular morphology and arrangement.

Over the years, the ideas expressed above have been widely disseminated and very generally accepted. The utility of the medium for diagnostic purposes would, therefore, appear to be above question. Certain disadvantages of Loeffler's medium have been recognized, however, and may be catalogued as follows:

1. It is sometimes rendered useless due to liquefaction by proteolytic organisms, therefore necessitating an "unsatisfactory" report.
2. It varies greatly from lot to lot, depending on the animal source of the serum used in its preparation, and on other factors which affect its composition.
3. Variation in composition materially affects its productivity as well as the cellular morphology of organisms.
4. It does not produce such definitive cellular morphology in *C. diphtheriae* as to make the organism positively identifiable when there are numerous diphtheroids in the culture.
5. *C. diphtheriae* is often overgrown or completely inhibited by commensal organisms.
6. Certain types of *C. diphtheriae* are either completely inhibited or, if they do grow, present such bizarre cellular morphology as to be unrecognizable.
7. Growth of certain other organisms, such as bacillary streptococci, often makes recognition of *C. diphtheriae* very difficult.

Further light has been thrown on the nutritive requirements of *C. diphtheriae* by the more recent studies of Mueller (*2*). From this work it appears that Loeffler's medium is a relatively poor base on which to grow the organism and that quite different results may be anticipated as to luxuriance of growth and morphology of *C.*

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diphtheriae depending on how the medium is prepared. In particular, there can be no uniformity in its preparation as different formulae call for beef, sheep or pig serum.

Experimental

Because of the objections to Loeffler's medium cited above, extended efforts have been made by the authors to develop a satisfactory substitute. Many substrates, of varying composition, have been tried during the past several years and, for one reason or another, abandoned. These have contained peptones, infusions, carbohydrates, blood, serum, tellurite and agar in different combinations and proportions. Some of the formulae were quickly dropped; others were more promising and merited further trial. Only two have appeared worthy of critical and extended trial in comparison with Loeffler's medium. One of these—dextrose serum tellurite agar—has been recommended as a plating medium (*3*) upon which to study colonial and cellular morphology and from which to isolate pure cultures for virulence tests.

However, in slant form on which nose and throat specimens were to be planted, as on Loeffler's medium, this did not prove to be an entirely satisfactory base. Further study resulted in the development of raffinose serum tellurite agar and its routine use for over a year has shown it to possess very definite advantages over Loeffler.

Preparation of Raffinose Serum Tellurite Agar Slants

To prepare 100 cc. of the medium

Weigh out 4.5 grams of Difco proteose No. 3 agar.

Dissolve the above in the Arnold sterilizer in 100 cc. buffered distilled water pH 7.1–7.2.*

Sterilize at 15 lbs. for 15 minutes in autoclave.

Cool to 50° C. in a water bath. This is important.

Add 10.0 cc. of stock raffinose serum tellurite solution aseptically. Mix thoroughly.**

Tube and slant aseptically. Make long slants if possible.

Incubate at 37° C. to test sterility.

Store slants in cold room; if tightly plugged they are satisfactory indefinitely.

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*Preparation of Buffered Distilled Water.

a. M/15 anhydrous disodium phosphate (Na_2HPO_4). Divide molecular weight given on the bottle by 15 and dissolve this amount of the salt in 1,000 cc. of distilled water.

b. M/15 anhydrous sodium acid phosphate (NaH_2PO_4). Divide molecular weight given on the bottle by 15 and dissolve this amount of the salt in 1,000 cc. distilled water.

c. To prepare 1,000 cc. buffered distilled water of pH 7.2 add 72.0 cc. of (a) above and 28.0 cc. of (b) above to 900 cc. of distilled water.

**Preparation of Stock Raffinose Serum Tellurite Solution.

The following sterile components are combined aseptically to give the stock solution. Human serum is specified, as it is easily obtainable from the serologic laboratory, but beef or other serum may be substituted although our results with these have not been as good as with human serum. Either crystalline potassium tellurite or the powdered salt is satisfactory and is used in 0.5 percent concentration.

Human serum	30.0 cc.
Raffinose solution (10%)	24.0 cc.
Potassium tellurite solution (0.5%)	6.0 cc.

Note: For preparation of above:

1. Human (Wassermann) serum is pooled and sterilized by Seitz filtration.
2. Raffinose solution (10%) is sterilized by Seitz filtration.
3. Preparation of potassium tellurite solution (0.5%) is as follows:
   Grind 0.5 gram of C. P. dry potassium tellurite very fine in a small dry mortar. Add buffered distilled water (10.0 cc.) gradually after grinding. Stir. Allow to settle. Remove clear supernatant by pipette to 100 cc. graduate. Repeat this process until all the tellurite appears to be dissolved. Add a few drops (0.33 ml.) of 10% KOH to the mortar. Rinse sides of mortar with 10 cc. distilled water. Add to graduate and make up volume to 100 cc. The final pH will be about 9.6. Seitz filter.

Caution: Keep C. P. potassium tellurite powder in a dessicator. If powdered tellurite is used add 0.33 ml. of 10% KOH to the solution.

Use and Advantages of Raffinose Serum Tellurite Agar Slants

Nose and throat swabs from suspected cases of diphtheria were planted, as received, on both Loeffler and raffinose serum tellurite slants, the Loeffler slants being inoculated first. After incubation for 18–22 hours smears were made, stained with methylene blue, and examined under the microscope.

The results of this comparative study, in the course of which hundreds of cultures were examined, have led to the following conclusions:

1. All strains and types of *C. diphtheriae* that we know of—including the small colony variety—grow luxuriantly on the medium.
2. Individual cells of *C. diphtheriae* are longer, fatter, and more pleomorphic when grown on raffinose serum tellurite agar than on Loeffler's medium
3. The cellular morphology of all types of *C. diphtheriae* is distinctive on this medium. Thus typing is facilitated.
4. Many varieties of commensal organisms are either completely inhibited or greatly restricted in their growth.
5. Certain streptococci, which are often confusing because of their growth in bacillary form on Loeffler's medium, appear as definite cocci or in chain formation on raffinose serum tellurite agar.
6. Rarely is there any need to plate out doubtful cultures since typical *C. diphtheriae* is often visible in discrete colonies on the slant.
7. Because the cellular morphology of all organisms is more distinct than on Loeffler's, those cultures diagnosed as negative are so reported

with more assurance than would otherwise be possible. Positives are likewise more definitely positive.

8. Cultures can be examined just as early as on Loeffler's medium.

9. The medium is stable and reproducible, the ingredients are easily obtainable, and large or small quantities are prepared with equal ease.

10. A higher percentage of positives will be obtained from raffinose serum tellurite agar slants than from Loeffler's.

Conclusions

1. The formula for a medium to replace that of Loeffler in the diagnosis of diphtheria has been presented.

2. This medium is inhibitory for some of the commensal organisms found growing with *C. diphtheriae* in the nose and throat.

3. The medium is stable and reproducible.

4. No strain of *C. diphtheriae* has yet been encountered that is inhibited on this medium.

5. More positive findings result from planting nose and throat cultures on raffinose serum tellurite agar slants than from planting the same swabs on the Loeffler medium.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 19, 1949

Of the total of 28,054 cases of measles reported (last week 28,520, 5-year median 22,266), the largest numbers, aggregating 14,905 cases were reported in the Middle Atlantic (5,817), South Atlantic (4,854), and West South Central (4,234) areas. Slight increases were reported in the North Central, South Atlantic, and Mountain areas. States reporting the largest increases are Wisconsin (940 cases last week to 1,425), Georgia (407 to 773), Arkansas (541 to 832), Oklahoma (335 to 613), North Carolina (827 to 1,083), and Colorado (417 to 630). For the year to date, 217,804 cases have been reported, as compared with a 5-year median of 152,241 and a total of 153,809 for the corresponding last year.

Of 3,780 cases of influenza reported (last week 3,948, 5-year median 4,054), Texas reported 1,517 (last week 1,873), South Carolina 754 (last week 549), Virginia 288 (last week 387), and Arkansas 265 (last week 193). No other State reported more than 154 cases. The total for the year to date is 49,087 cases, less than half any corresponding figure of the past 5 years except that of 1945 (46,295).

A total of 51 cases of poliomyelitis was reported (last week 64, 5-year median 24), of which Texas reported 14 (last week 7) and California 11 (last week 13). No other State reported more than 3 cases. The total for the 52-week period since the average date of seasonal low incidence is 28,250 cases, as compared with a 5-year median of 13,803 and 25,409, in the 1946–47 period, the largest corresponding figure of the past 5 years.

Two cases of psittacosis were reported in Maryland, and 2 cases of smallpox, 1 each in Michigan and Kansas.

The cumulative figures for Rocky Mountain spotted fever (no cases reported currently) and tularemia are, respectively, 12 and 315 cases, as compared with corresponding 5-year median expectancies of 4 and 218.

Deaths registered during the week in 94 large cities in the United States totaled 9,799, as compared with 9,829 last week, 10,045 and 10,226, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 10,045. The total to date is 108,676, as compared with 113,408 for the corresponding period last year. Infant deaths totaled 676, last week 682, 3-year median 624. The cumulative figure is 7,401, same period last year, 7,669.

Telegraphic case reports from State health officers for week ended Mar. 19, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	...	...	514	1	5	...	...	60	...	...	...	23	...
New Hampshire	...	...	1	110	...	2	...	...	6	...	...	...	5	...
Vermont	...	...	...	236	1	...	...	...	7	...	...	...	4	...
Massachusetts	11	1	...	1,455	1	...	...	...	260	...	...	...	69	...
Rhode Island	...	...	...	114	...	...	...	...	1	...	...	...	7	...
Connecticut	2	...	7	531	...	94	...	...	44	...	...	1	7	...
MIDDLE ATLANTIC														
New York	12	...	[b] 4	2,156	3	302	1	...	[a] 383	...	...	2	116	6
New Jersey	5	...	3	1,244	...	75	2	...	171	...	...	1	42	6
Pennsylvania	15	...	(b)	2,417	7	...	...	...	202	...	...	5	81	2
EAST NORTH CENTRAL														
Ohio	13	...	1	275	4	56	...	...	443	...	1	2	60	15
Indiana	3	...	1	125	...	11	...	...	125	...	...	5	16	18
Illinois	5	...	71	79	3	159	...	...	209	...	...	2	40	...
Michigan [a]	1	...	...	677	2	55	...	...	488	1	...	1	38	...
Wisconsin	1	2	56	1,426	1	11	...	...	79	...	...	...	44	...
WEST NORTH CENTRAL														
Minnesota	1	...	...	123	5	9	1	...	58	...	...	...	2	...
Iowa	...	...	1	37	1	2	...	...	24	...	...	1	4	4
Missouri	4	...	11	564	3	32	3	...	60	...	...	1	5	...
North Dakota	...	...	21	37	...	...	...	...	17	...	...	...	2	...
South Dakota	1	...	...	11	...	...	...	...	...	...	...	...	...	...
Nebraska	1	...	1	149	2	4	...	...	9	...	...	...	1	...
Kansas	...	...	54	1,238	1	11	...	...	27	1	1	...	1	...
SOUTH ATLANTIC														
Delaware	...	...	...	22	...	...	...	...	20	...	...	...	...	...
Maryland [a]	...	...	2	1,179	1	42	...	...	[a] 31	...	...	3	7	...
District of Columbia	...	...	...	105	1	19	...	...	14	...	...	...	6	...
Virginia	2	...	288	1,082	3	89	...	...	22	...	...	...	13	1
West Virginia	...	...	61	133	...	6	...	...	20	...	...	...	9	...

South Carolina	1	----	754	396	1	211	----	----	6	----	----	2	16	4
Georgia	----	----	20	773	----	32	1	----	6	----	2	1	2	8
Florida	4	----	1	101	1	15	1	----	6	----	----	1	1	2
EAST SOUTH CENTRAL														
Kentucky	1	----	3	372	3	13	1	----	34	----	----	2	5	9
Tennessee	4	----	148	524	5	175	----	----	46	----	1	6	15	----
Alabama	1	----	130	667	1	76	----	----	19	----	----	1	8	8
Mississippi [a]	6	1	49	126	----	24	1	----	4	----	3	1	4	----
WEST SOUTH CENTRAL														
Arkansas	0	----	265	832	1	147	1	----	5	----	1	2	3	----
Louisiana	4	----	2	15	----	17	3	----	3	----	2	2	1	----
Oklahoma	2	----	48	613	2	33	----	----	8	----	1	----	2	5
Texas	12	----	1,517	2,774	6	471	14	----	18	----	2	2	116	25
MOUNTAIN														
Montana	----	----	1	62	----	3	----	----	11	----	----	----	----	----
Idaho	----	----	3	98	----	12	----	----	[c] 22	----	----	----	5	----
Wyoming	----	----	----	22	----	12	----	----	4	----	----	----	1	----
Colorado	1	----	54	630	----	30	----	----	14	----	----	----	9	----
New Mexico	1	----	2	248	----	27	----	----	15	----	----	----	----	----
Arizona	3	----	154	124	----	22	----	----	7	----	----	----	12	1
Utah [a]	1	----	3	97	----	3	3	----	6	----	----	----	36	----
Nevada	----	----	----	2	----	----	----	----	----	----	----	----	----	----
PACIFIC														
Washington	----	----	10	335	2	8	3	----	53	----	----	----	3	----
Oregon	2	----	7	504	1	22	3	----	21	----	----	1	28	----
California	8	2	26	1,638	4	43	11	----	[c] 102	----	----	1	33	4
Total	137	6	3,780	28,054	70	2,380	51	----	3,252	2	16	47	901	----
Median, 1944-48	262	9	4,054	22,266	186	----	24	----	4,024	8	12	52	2,309	----
Year to date 11 weeks	1,989	75	49,087	217,804	940	26,975	923	12	31,484	22	316	460	11,341	----
Median, 1944-48	3,233	94	113,008	152,241	2,283	----	397	4	36,525	85	----	485	24,669	----
Seasonal low week ends	(27th) July 10	----	(30th) July 31	(35th) Sept. 4	(37th) Sept. 18	----	(11th) Mar. 20	----	(32nd) Aug. 14	(35th) Sept. 4	----	(11th) Mar. 20	(39th) Oct. 2	----
Since seasonal low week	7,054	----	85,357	270,197	1,784	----	28,250	----	54,182	37	----	3,579	21,374	----
Median, 1943-48	10,799	----	156,586	178,365	3,737	----	13,803	----	75,096	161	----	4,726	49,039	----

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[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever; currently reported separately, as follows: Connecticut, 1; Indiana, 1; South Carolina, 1; Georgia, 1; salmonella infections, not included, were reported as follows: New York, 2; Pennsylvania, 2.

Alaska: Influenza, 13; measles, 1; pneumonia, 2; streptococcal sore throat, 1; rabies in animals, 1.

Territory of Hawaii: Influenza, 92; diphtheria, 1; measles, 221; lobar pneumonia, 1; poliomyelitis, 3.

PLAGUE INFECTION IN TEXAS AND WASHINGTON

Under dates, respectively, of March 18 and 16, 1949, plague infection was reported proved in specimens taken in Yoakum County, Tex., and Yakima County, Wash., as follows:

TEXAS

Yoakum County.—In a pool of 441 fleas from 13 nests of pack rats, *Neotoma* sp., collected January 25 and 27.

WASHINGTON

Yakima County.—In a pool of 104 fleas from 62 short-tailed meadow mice, *Lagurus curtatus*, trapped February 25 on the United States Army firing range 10 miles northeast of Yakima, a pool of 416 fleas from 136 white-footed mice, *Peromyscus maniculatus*, trapped at the same location, and a pool of 106 fleas from 81 white-footed mice, *Peromyscus maniculatus*, trapped March 1 on Hanford Road, 18 miles east of Yakima.

TERRITORIES AND POSSESSIONS

Hawaii Territory

Plague (in rodents and fleas).—Under date of March 12, 1949, plague infection was reported proved on February 4 in a mass inoculation of tissue from 10 rats trapped in District 16A, in Kailua Gulch in the Makawao District, Island of Maui, T. H.

Under date of March 16, 1949, 3 plague infections were reported found on February 24, 1949, in Hamakua District, Island of Hawaii, T. H., in mass flea inoculations as follows: In 7 fleas from rats trapped in District 6B; in 12 fleas from rats trapped in District 7A; and in 10 fleas from rats trapped in District 6A.

DEATHS DURING WEEK ENDED MAR. 12, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar. 12, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,829	9,829
Median for 3 prior years	9,829	
Total deaths, first 10 weeks of year	98,877	108,363
Deaths under 1 year of age	682	640
Median for 3 prior years	639	
Deaths under 1 year of age, first 10 weeks of year	6,726	7,040
Data from industrial insurance companies:		
Policies in force	70,550,208	66,819,835
Number of death claims	14,913	14,726
Death claims per 1,000 policies in force, annual rate	11.0	11.5
Death claims per 1,000 policies, first 10 weeks of year, annual rate	9.8	10.7

FOREIGN REPORTS

CUBA

Habana—Communicable diseases—4 weeks ended February 26, 1949 — During the 4 weeks ended February 26, 1949, certain communicable diseases were reported in Habana, Cuba, as follows

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	8		Measles	24	1
Diphtheria	21	2	Tuberculosis	7	
Leprosy	8		Typhoid fever	9	1

Provinces—Notifiable diseases—4 weeks ended February 26, 1949 During the 4 weeks ended February 26, 1949 cases of certain notifiable diseases were reported in the Provinces of Cuba as follows

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	6	17	10	24	4	12	73
Chickenpox		9		3	4	2	18
Diphtheria	1	32	4		1	1	39
Leprosy		9				1	10
Malaria		2		3	3	21	29
Measles		29	2	3			34
Poliomyelitis						3	3
Tuberculosis	7	21	4	18		12	62
Typhoid fever	1	17	2	7	2	38	67
Whooping cough		20				1	21
Yaws						2	2

[1] Includes the city of Habana

GOLD COAST

Cerebrospinal meningitis —Further information on the outbreak of cerebrospinal meningitis in Gold Coast, French West Africa, states that 1,721 cases with 128 deaths occurred during the week March 2–9 in Northern Territories, and that a total of 5,380 cases with 421 deaths has been reported to date In Ashanti 8 cases and 20 suspected cases have been reported

JAMAICA

Notifiable diseases—4 weeks ended February 26, 1949 – For the 4 weeks ended February 26, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Chickenpox	12	23	Leprosy	1	
Diphtheria	1	3	Tuberculosis (pulmonary)	22	66
Dysentery	1		Typhoid fever	7	58
Erysipelas	2	3	Typhus fever	1	

NEW ZEALAND

Notifiable diseases—4 weeks ended January 29, 1949.—During the 4 weeks ended January 29, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	6	--------	Ophthalmia neonatorum	1	--------
Diphtheria	15	1	Poliomyelitis	104	4
Dysentery:			Puerperal fever	8	--------
Amebic	4	--------	Scarlet fever	62	--------
Bacillary	7	--------	Tetanus	1	--------
Encephalitis, lethargic	2	2	Tuberculosis (all forms)	148	41
Erysipelas	10	--------	Typhoid fever	11	1
Food poisoning	16	--------	Undulant fever	1	--------
Malaria	1	--------			

SWITZERLAND

Notifiable diseases—January—December 1948.—During the year 1948 (January–December), cases of certain notifiable diseases were reported in Switzerland as follows:

Disease	January	February	March	April	May	June
Cerebrospinal meningitis	7	6	12	3	8	6
Chickenpox	388	378	358	255	213	283
Diphtheria	420	258	223	159	162	155
Dysentery	--------	1	2	--------	--------	7
Encephalitis, lethargic	--------	--------	1	--------	1	1
Hepatitis, epidemic	38	73	45	19	21	42
Influenza	286	175	183	88	47	46
Measles	330	317	496	382	312	338
Mumps	187	153	207	138	97	85
Paratyphoid fever	4	2	4	5	9	7
Poliomyelitis	7	3	3	4	24	44
Scarlet fever	405	385	479	364	306	385
Trachoma	--------	--------	--------	--------	--------	1
Tuberculosis	267	296	364	281	338	419
Typhoid fever	1	3	5	5	8	6
Undulant fever	8	7	18	9	16	21
Whooping cough	296	283	442	537	520	742

Disease	July	August	September	October	November	December
Cerebrospinal meningitis	7	3	6	8	10	6
Chickenpox	228	163	89	140	200	434
Diphtheria	89	152	206	219	202	210
Dysentery	8	35	1	1	1	--------
Encephalitis, lethargic	2	1	1	--------	--------	--------
Hepatitis, epidemic	20	46	72	30	44	54
Influenza	8	44	29	80	94	520
Malaria	1	--------	--------	--------	--------	--------
Measles	228	179	226	188	247	777
Mumps	75	66	106	90	99	227
Paratyphoid fever	13	37	48	16	5	8
Poliomyelitis	42	110	177	82	32	16
Scarlet fever	290	1,523	986	439	371	256
Trachoma	--------	--------	--------	1	--------	--------
Tuberculosis	267	281	373	228	267	330
Typhoid fever	3	6	15	8	2	1
Undulant fever	17	17	19	12	7	6
Whooping cough	511	531	746	471	630	828

NOTE.—Imported cases, not included in above tables, are as follows: Diphtheria, 9; leprosy, 1; malaria, 1; poliomyelitis, 1; scarlet fever, 9; typhoid fever, 2.

MADAGASCAR

Notifiable diseases—January 1949.—Notifiable diseases were reported in Madagascar and Comoro Islands during January 1949 as follows:

Disease	January 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Bilharziasis			93	0
Cerebrospinal meningitis			6	4
Diphtheria	2	0	7	2
Dysentery:				
Amebic	11	0	229	5
Bacillary	2	0	1	0
Erysipelas	1	0	18	0
Influenza	17	0	1,794	42
Leprosy			22	0
Malaria	416	5	36,303	229
Measles	1	0	60	1
Mumps	7	0	128	0
Plague	1	0	22	18
Pneumonia, broncho	1	1	237	48
Pneumonia, pneumococcic	3	0	264	50
Poliomyelitis			1	0
Puerperal infection			3	1
Scarlet fever	1	0		
Trachoma			1	0
Tuberculosis, pulmonary	6	2	108	19
Typhoid fever	6	0	27	3
Whooping cough			305	8

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—Cholera was declared epidemic in Caluctta, India, on January 18, 1949. Reported incidence in that city since January 1, 1949, is as follows: January 1–31, 638 cases, 192 deaths; February 1–19, 447 cases, 158 deaths; week ended February 26, 95 cases, 35 deaths; week ended March 5, 103 cases, 35 deaths.

Plague

India—Cawnpore.—During the week ended March 5, 1949, 14 cases of plague with 2 deaths were reported in Cawnpore, India.

Indochina (French)—Cambodia—Pnom-Penh.—During the week ended March 12, 1949, 5 cases of plague were reported in Pnom-Penh, Cambodia State, French Indochina.

Peru—Lambayeque Department.—During the period February 1–28, 1949, 4 cases of plague were reported at Ucupe Farm, Chiclayo Province, Lambayeque Department, Peru.

Union of South Africa.—Plague has been reported in the Union of South Africa as follows: Week ended February 12, 1949, 3 suspected cases in Glen Grey District, Cape Province; week ended February 26, 3 cases in Orange Free State—2 in Koppies District and 1 in Parys District, and 4 cases in Randfontein District, Transvaal.

Smallpox

Arabia—Aden Protectorate—Makalla.—For the week ended March 12, 1949, 3 cases of smallpox were reported in Makalla, Aden Protectorate.

Bahrein Islands—Bahrein.—For the week ended March 12, 1949, 2 cases of smallpox were reported in Bahrein, Bahrein Islands.

Burma.—Information dated March 19, 1949, states that Rangoon and Moulmein were declared infected with smallpox as of February 6, 1949. During the month of February, Rangoon reported 63 cases with 18 deaths, and Moulmein reported 23 cases with 3 deaths. Reported for week ended March 5 were Rangoon, 16 cases; Moulmein, 5 cases; for week ended March 12, Rangoon, 17 cases; Moulmein, 4 cases.

China.—During the period February 1–28, 1949, smallpox was reported in cities in China as follows: Amoy, 75 cases, 11 deaths; Canton, 56 cases, 4 deaths; Shanghai, 49 cases, 19 deaths.

Cuba—Havana.—Information dated March 18, 1949, reports 1 case of smallpox in the city of Havana. This case is stated to have developed in a citizen who returned to Havana by plane from Mexico City on March 4. The case was diagnosed on March 16, and confirmed on March 20.

India.—Smallpox has been reported in cities in India as follows: In Ahmedabad, week ended February 26, 1949, 71 cases, 55 deaths; in Bombay, week ended March 5, 77 cases, 23 deaths, week ended March 12, 122 cases; Madras, week ended March 5, 44 cases, 7 deaths.

India (Portuguese).—During the week ended February 12, 1949, 14 cases of smallpox were reported in Portuguese India.

Indochina (French)—Tonkin State.—For the week ended March 5, 1949, 136 cases of smallpox, with 5 deaths, were reported in Tonkin State, French Indochina.

Iraq.—During the period December 1–31, 1948, 431 cases of smallpox with 79 deaths were reported in Iraq, and for the period January 1–31, 1949, 154 cases with 24 deaths were reported.

Peru.—For the period February 1–28, 1949, 294 cases of smallpox were reported in Peru.

Typhus Fever

France.—During the week ended January 29, 1949, 1 case of typhus fever was reported in Seine Department, France.

Pakistan.—During the week ended March 5, 1949, 31 cases of typhus fever, with 7 deaths, were reported in Northwest Frontier Province, Pakistan.

Yellow Fever

No reports of yellow fever were received during the current week.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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FEDERAL SECURITY AGENCY
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PUBLIC HEALTH SERVICE
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Public Health Reports

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The Work of State and Local Industrial Hygiene Agencies

By Victoria M. Trasko*

Maintenance of the health of the Nation's labor force is a direct responsibility of State and local industrial hygiene agencies in the country. How well this responsibility is carried out may be ascertained from the annual reports of 45 of these agencies in 38 States. These reports tell of industrial hygiene services provided almost 6 million workers in the interest of maintaining a healthful working environment. They strongly reflect the fact that no other public health field presents such a multiplicity of problems and situations involving the health and welfare of so large a segment of our population or offers such diversified activity. These annual reports are used for obtaining a picture of industrial hygiene activities in this country, carried on by the reporting agencies during the 1947 calendar or 1948 fiscal year.

Administrative Organization

At the present writing, 58 State and local industrial hygiene units are functioning on a full or limited basis in 44 State health departments, 2 State labor departments, 8 local health departments, the District of Columbia, and the territories of Hawaii, Puerto Rico, and Alaska. The appropriations for 1948 fiscal year totaled $2,500,723, of which 53.5 percent was derived from Federal sources, and 46.5 percent from State and local sources.

Approximately 400 professional personnel are employed by these agencies. Of this number 66 percent are engineers and chemists, and another 11 percent are sanitarians and inspectors. Physicians make up 10 percent of the total number, and nursing consultants another 10 percent. The remaining 3 percent consist of a miscellaneous group of professional and technical personnel.

In addition to direct industrial hygiene services, the agencies bring to industry more or less complete health programs by integrating their

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work with that of other divisions in the State government, such as sanitation, venereal disease and tuberculosis control. When feasible, they maintain working relationships with local health departments in their investigative work in industries in their areas, and utilize their facilities as headquarters for branch offices. They cooperate with labor departments and industrial commissions through exchange of reports of occupational diseases and reciprocal arrangements for field investigations. Cooperative relationships are also maintained with professional organizations such as the medical societies and nurses' organizations, particularly concerning in-plant health services, and with labor unions in enlisting management and employee cooperation and in arranging for studies and health services. State and local programs are integrated with that of the Division of Industrial Hygiene, Public Health Service, through such activities as consultative services on administration and technical phases of programs, the application of standard practices, and in the conduct of research field studies.

Field Services

Most of the field activities are devoted to routine investigations and evaluations of environmental health hazards and recommendations for their control. When the agencies are staffed with medical and nursing personnel, the services are extended to medical evaluations of industrial diseases, and to improvement of in-plant health programs. However, each service, each investigation, is unique in itself and demands individual attention and solution, often taxing the ingenuity and knowledge of staff members.

Atmospheric Pollution Control

In the past, investigation of so-called nuisance complaints, especially those dealing with atmospheric contamination, was a routine though comparatively minor activity of most industrial hygiene agencies. Today, it is fast becoming one of their important activities. This growing emphasis is due in part to the transcendence of atmospheric pollution from the nuisance stage to problems of public health implication. The Los Angeles smog and the Donora disaster, among other local and less publicized situations, have focussed much attention on problems of this nature, making people more aware of air contamination than ever before, and demanding action for abatement. In addition, the increased centralization of large industries in the same area, or in areas which heretofore have been free of industry, is presenting air pollution problems of greater magnitude than in previous years.

Most of the reporting agencies are experiencing notable increases in requests for assistance in abating and controlling atmospheric nuisances due to gases, vapors, fumes, and dusts. They are asked to assist because they have the necessary equipment and technically trained personnel for scientific collection and evaluation of air contaminants. These investigations are not only time-consuming, but, where personnel shortages are still felt, they may seriously hamper their in-plant activities. Even in those localities where special agencies are set up to deal with pollution control, the industrial hygiene personnel are called in to assist with the field and laboratory work, and in the preparation of ordinances and regulations to control the nuisances.

Numerous investigations were reported, some involving air contamination of communities by groups of industries, others by single industrial establishments. For example, the West Virginia division has completed a soot-fall study of 2 years' duration in the Charlestown area. Another study is under way in a Utah town of 20,000 to study the effects on the health of the community of sulfur dioxide discharged into the air by smelters.

Everyone is now familiar with the smog condition in the Los Angeles area, which had its beginning in the war-time industrial boom. Industrial fumes which were polluting the atmosphere. caused irritation of the eyes and nasal passages of the residents, Because of the complexity of the situation, a special agency has been set up to work on the problem. However, this was effected only after much effort had been expended by local and other industrial hygiene agencies in determining the source and nature of pollution.

Another situation in which atmospheric pollution may present even more serious and tragic implication is exemplified by the recent Donora [1] disaster in which 20 persons lost their lives. A study is being currently conducted by the Public Health Service and the Pennsylvania State Department of Health in order to determine the nature of the atmospheric contaminants in that area and their pathological effects on the residents.

Among other industries which have been investigated because they were polluting the atmosphere are lead smelters, metal reclamation plants, chemical plants, talc mills, stone crushing mills, paper mills, rendering and fertilizer plants, and varnish cookers. Even food products such as rice, alfalfa and other grass crops prepared for stock feeds were found responsible for nuisance dust problems. An unusual instance was reported by the Georgia division, which assisted in the abatement of a neighborhood dust pollution problem created by the peanut industries. In harvesting the peanut crop, most companies use pneumatic unloaders which, as a rule, are not constructed to handle finely divided dust. Consequently, the dust is discharged into the atmosphere. A sample of the settled dust in this particular town showed a silica content of approximately 52 percent, indicating that large numbers were exposed to high silica dust.

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[1] The Donora disaster occurred in October 1948.

In addition, several divisions have reported the development of necessary laboratory procedures and even the construction of equipment for collection of samples of air. For example, the Illinois division worked out a method for evaluating atmospheric soot concentrations in the air. This work was undertaken because of the increased demand for services with regard to nuisances and inadequacy of procedures for measuring dust and soot pollution by local abatement agencies.

Radiation

The utilization of atomic energy is of paramount interest to industrial hygienists in the State and local agencies. At present very little use is made industrially of radio-active isotopes apart from radium and other naturally occurring ones. Technical studies are limited chiefly to the evaluation of possible health hazards from excessive or stray radiation involved in luminous painting, static eliminators, industrial X-ray installations, shoe store fluoroscopes, and in laboratories and clinics where X-ray pictures are taken. Plants using radium paint, as in dial painting, are under the constant surveillance of industrial hygienists since divisions recently noted a laxity in safe health practices established during the war. On occasion assistance is given to other agencies engaged in research with radio-active materials in the establishment of health programs for workers exposed to dangerous rays, or in the evaluation of associated health hazards.

Agriculture

The introduction of new toxic chemicals and the addition of mercury and other organic compounds in seed treating, fertilizers, insecticides, and fungicides have drawn the attention of industrial hygiene officials to the potential health dangers in the agricultural industry. Many places of employment were visited in order to determine the extent to which the toxic chemicals are being used and whether adequate control methods are in force.

For example, the California State division has done considerable experimental work with ethylene chlorhydrin in the treatment of seed potatoes to break their dormancy period and speed up the time required under normal procedures for sprouting. Their attention was called to the use of this chemical after one worker was killed and five others were hospitalized. Information on the toxic limit for this chemical is not clearly established, and the division in cooperation with other agencies is investigating the concentrations to which workers may be exposed without injury, and the means for controlling the exposure. The material is used experimentally at the present, but because of the economic value in shortening the dormancy period of seed potatoes, its use will no doubt be extended in the future.

Environmental Control

The annual reports mention numerous studies of the familiar types of occupational hazards, such as lead and silica exposures in potteries, fumes and dusts in foundries, solvents in degreasing operations and in dry-cleaning establishments; exposures to abnormal factors in the environment, such as excessive temperatures and humidities, continuous vibration, and improper lighting in offices and schools. The West Virginia division, among others, reported dust surveys in the bituminous coal mines, conducted in order to better acquaint the coal-mining industry with the extent of silicosis-producing dust exposures. The New Hampshire and Washington divisions made sanitation surveys in lumber camps in order to improve conditions in the sanitation and construction of these camps.

New methods in processing food products are not without their hazards, many of the activity reports reveal. The use of ultraviolet lamps for prevention of mold and bacterial contamination of products, especially meat, is growing more common. Many of the studies revealed excessive radiation from the lamps resulting in serious eye irritation among the persons exposed.

The unguarded use of potentially toxic fumigants was among other common investigations. For instance, a study was made in a plant using methyl bromide for fumigating various food products and raw materials for vitamin preparation. It was found that the plant did not provide for removing the methyl bromide vapors before the workers entered the fumigating chambers, thus endangering their lives. It was necessary for the industrial hygienists to devise ways for controlling this exposure.

The carbon monoxide hazard in garages, automobile repair shops, buildings and even in homes creates much work for industrial hygiene divisions. Many times these investigations are made only after persons have been overcome by carbon monoxide gas. Dangerous conditions were caused by improper installations in homes and in buildings, poor ventilation in garages, lack of adequate exhaust ventilation and the use of gasoline powered-lift trucks in enclosed areas. Several divisions have prepared bulletins for distribution outlining hazards and means for their control in automobile repair shops and garages.

The investigation of industrial fires and explosions resulting from the manufacture of chemicals is reported as a regular feature of the work of the New York division's chemical unit. For example, an investigation was made of two explosions in a plant engaged in powdering aluminum by a dry ball mill process. After the first explosion, the unit recommended the use of inert gases, but management objected because of the cost. It was not until after the second explosion with the serious structural damage resulting that management agreed to install the inert gas process in departments where aluminum powder was processed.

Among health problems investigated which did not emanate directly from the production or service industries were: Checking the efficiency of air conditioning equipment to be used on planes while on the ground; and a study of the extent of construction workers' exposure to hazards of silicosis at operations on an irrigation project on the west coast. During the construction of numerous highway and river bridges, industrial hygiene units checked on the adherence to rules of standards of operation where men work under compressed air conditions.

Every year some division reports the investigation of cases of deaths or illness due to lead poisoning among children as a result of burning old storage battery boxes as fuel at home.

At the request of the Industrial Commission, the Florida division investigated three deaths from hydrogen sulfide poisoning in a well in the Everglades. This study resulted in the writing of preventive procedures for the protection of well cleaners.

The Illinois division investigated several deaths which occurred in a fire in a trailer equipped with automatic carbon tetrachloride fire extinguishers. Studies showed that phosgene may well have been a contributing factor, pointing to the dangers in the use of such extinguishers in domiciles.

Numerous divisions made investigations to determine the extent, if any, of the hazard to students and instructors in trade and vocational schools. As a rule, the hazard is at a minimum since the exposure to toxic products is not prolonged. The California division, in addition to studying the potential health hazards in such schools, utilizes the opportunity for educating the individuals in the recognition of hazards which may be associated with their work and means for their control.

The New Hampshire division made a study of mercury exposures to instructors and students in universities and high schools. Exposure in high schools was found to be negligible in most cases, as very little mercury is used and only for short periods. In colleges and universities, however, excessive concentrations were found in both physics and chemistry laboratories chiefly from spilled mercury lodged in floor cracks, in benches and equipment, and on the back of mop boards. Methods for removal were suggested, and physical examinations were made on all persons with high exposures.

In-Plant Health Services

An extensive variety of activities was likewise reported by medical and nursing personnel in the State and local industrial hygiene agencies. In addition to medical evaluation and assistance with diagnosis and treatment of occupational illness, considerable work was done in assisting individual plants in organizing or improving health services for their workers.

It is not known how many industries have started new health programs during this period, but isolated reports indicate that such programs are being initiated. For example, the South Carolina division reported the establishment of 13 new health programs with medical and full-time nursing services. Tennessee reported that 17 plants for the first time employed graduate nurses for their dispensaries.

As a rule, small plants either cannot afford full-time medical services for their employees or are not aware of the benefits to be derived from such services. As the bulk of industrial establishments in this country falls into this category, efforts are exerted by State and local divisions in devising ways for bringing essential medical services to workers in small plants and in demonstrating the value of the services. The problem is approached in numerous ways. In Connecticut a group of small industries which have full-time registered nurses and the necessary medical facilities employed a full-time physician who spends a number of hours at each plant in order to provide adequate medical service. In Los Angeles City a public health nurse with industrial experience, assigned from the Division of Public Health Nursing, made weekly visits to a group of participating plants as part of a project to demonstrate the value of part-time service in order to induce the plants to initiate their own programs. In Syracuse, New York, a similar project was undertaken with the cooperation of the Visiting Nurses Association. In Georgia, the Winder clinic, established in 1942 and maintained cooperatively by a group of neighboring industries, is continuing to operate successfully. The chief drawback in starting similar plans among other industries is the shortage of medical and nursing personnel.

During the recent year, projects were undertaken to determine the status of the health of workers as a whole through state-wide or industry-wide studies. The New Hampshire division made a comprehensive study in cooperation with other health agencies in the State department and uncovered many unsuspected health hazards, notably serious heart conditions in employees working on dangerous moving machinery, active tuberculosis cases, syphilis, and trench mouth. Individuals working in key positions which require alertness and good hearing were found to have defective hearing.

The Pennsylvania division is investigating the status of dental health among workers handling such products as sugar and flour; lead, mercury, and other chemicals. The division has its own portable unit and has made 2,144 dental examinations, including X-rays. Studies conducted by this division, as well as those being conducted by the Public Health Service in specific industries, may throw considerable light on the association of oral manifestations with industrial exposure to certain materials.

In Mississippi, the division is sponsoring a state-wide physical examination program whereby private physicians examine workers referred to them by industries. The examinations are paid for by the companies, and the standard physical examination forms are supplied by the State industrial hygiene division. Copies of the examinations are sent to the division to permit a study of the physical conditions revealed by the examinations.

About one-half of the agencies reported a continuation of cooperative activities with the divisions of tuberculosis control in case-finding surveys. As a result of such cooperative programs, approximately 400,000 workers received chest X-rays during the period covered by this summary. As a rule, the industrial hygiene divisions make the necessary arrangements for holding the clinics. Pennsylvania is an exception in that the entire program and work is the responsibility of the industrial hygiene division. An outgrowth of these surveys is the development of arrangements, as in St. Louis, whereby it will be possible for plant physicians to have applicants receive a small film chest X-ray through the health centers as part of the pre-placement physical examinations. The case-finding programs have proved valuable in uncovering not only cases of tuberculosis but also cases of suspected silicosis with history of dust exposure.

Statistical Summary of Activities

Evaluation of the volume of work performed for industry, or even selection of those activities that are indicative of accomplishment in industrial hygiene are not simple matters. A voluntary project aimed at developing standard reporting of industrial hygiene activities has been in effect for 9 years, as a cooperative activity of the Division of Industrial Hygiene, Public Health Service, and a special reports committee of the American Conference of Governmental Industrial Hygienists. This plan provides for voluntary submittal of periodic activity reports, including a statistical summary of activities, compiled according to a standard form. It is only as the result of this project that national summaries providing some indication of the scope and extent of industrial hygiene activity are possible.[3]

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[3] Last summary entitled "In Industry's Service", was published in Occupational Medicine, April 1947.

During the period under study, the 45 State and local agencies located in 38 States gave 37,336 different services to 25,700 industrial establishments, involving 5,938,470 workers. The estimated labor force in the 38 States with divisions of industrial hygiene covered by this report is approximately 55 million, indicating that these agencies reached only 11 percent of the labor force in their States. When this number is projected against the entire civilian labor force of 60 million, the proportion is not quite 10 percent. In this connection, it must be mentioned that, while practically every industry is represented by the services, major emphasis continues to be placed on industries with potential health hazards, such as manufacturing, mining, and related service industries.

A summary of the number and type of general services given to 25,700 industrial establishments is presented in table 1. The services are grouped according to broad categories in order to facilitate a summarization. The classification does not attempt to evaluate the length or extensiveness of the various services. For instance, a plant survey may require only one visit for completion; a lead study may require series of visits over weeks, involving much detailed field and laboratory work.

Table 1. *Summary of field and related services given to industrial establishments by 45 industrial hygiene agencies*

Total number of field services	37, 336
Total number of agencies reporting	45

	Percent of total services	Number of agencies reporting
General type of field service:		
Plant surveys	22	45
Technical studies of occupational health hazards	10	44
Nuisance complaints investigated	1	33
Other environmental types including routine inspections, sanitation inspections	37	33
Services pertaining to promotion, establishment or improvement of:		
In-plant health programs	6	27
Nursing services specifically	8	28
Occupational disease investigations	1	20
Miscellaneous services pertaining to in-plant feeding, case finding surveys, etc	2	19
Follow-up on status of recommendations	13	40
Related services:	*Number*	
Physical examinations of workers	2, 226	13
Dental examinations of workers	2, 144	1
Examination of plans for ventilating and other control equipment	2, 649	12
Laboratory examinations and analyses	39, 665	40
Field determinations of atmospheric contaminants	15, 656	37
Field determinations of physical conditions	14, 633	35

Of the 37,336 services reported, those dealing with environmental control predominated, accounting for approximately three-fourths. This predominance is not surprising as basic industrial hygiene services center on environmental control of health hazards, and the divisions are staffed with a large proportion of engineering and chemical personnel. Twenty percent of the services consisted of plant surveys in which an evaluation of plant facilities, processes and exposures was made. All 45 units reported carrying on this plant activity. Ten percent consisted of technical studies of occupational health hazards, examples of which have been given in the fore part of the report. One percent of all the services comprised investigations on the control or abatement of nuisances and atmospheric pollution problems. A comparatively large proportion, or 37 percent, consisted of routine plant inspections, sanitation inspections, and consultations on problems of the working environment. However, over 20 of the 37 percent of these services were contributed by one large State division whose staff concentrates on routine or preliminary type of plant inspections.

Of the other types of services listed, one percent was investigations of occupational diseases involving assistance in diagnosis and treatment. Services pertaining to the promotion, establishment or improvement of in-plant health services accounted for 6 percent; and those relating specifically to nursing services, for another 8 percent. Another 2 percent comprised services pertaining to nutritional advice and in-plant feeding facilities, the promotion of, or participation in, case-finding surveys, and other not specified health activities. Follow-up visits for ascertaining the status of recommended improvements made up 13 percent of the total, reflecting little change when compared with the proportion of this type of activity reported in other years.

Among the related field services listed are 2,226 physical examinations of workers and 2,144 dental examinations which were performed in connection with technical studies and investigation of claims for occupational diseases. The examination of ventilating and other control plans prior to the installation of equipment in plants is a legal function of one division which reported most of the 2,647 plans examined. The other ten agencies examine such plans only occasionally and upon request from industry or agencies.

Recommendations

Not all 45 units submitting activity reports gave information consistently regarding improvements recommended to industry as a result of their services and investigations. However, information from 31 units indicates there is still considerable need for corrections and improvements and that industry is carrying out the recommendations in accordance with expectations.

For instance, the 31 divisions for which this type of information is available gave services in 20,129 plants affecting 4,453,000 workers. They recommended 13,660 different improvements in the working environment or for in-plant health services in 30 percent of the plants, covering one-third of the workers.

It is not practical to expect complete compliance with recommendations during a definite period of time, even if follow-up visits are made in every case, as it takes time to put the recommended improvements into effect. Reports from the 31 units show that one-third of the recommendations were carried out for 40 percent of the workers in 37 percent of the plants in which they were made. Unfortunately, shortages in personnel, and the demand for direct services curtail the amount of follow-up work done by the agencies. In fact, some units do practically no follow-up work; whereas others check each plant routinely.

Laboratory Services

In connection with the field studies of occupational hazards, a total of 39,665 laboratory examinations and tests was reported by 40 units. These consist of analyses of airborne contaminants, materials used in industrial processes, and biological materials Sometimes the tests are made directly in the field in order to determine the degree or extent of contamination of gases, solvents, and other air-borne contaminants. These are not always recorded, but 37 agencies reported over 15,656 measurements of this type. Thirty-five divisions reported 14,633 other measurements of physical conditions such as ventilation velocity, illumination, radiation, etc.

Simultaneously with routine analytical work, several laboratories are evaluating and developing new methods of analyses as well as improving old methods for the determination of toxic ingredients. Among the projects mentioned in the reports are improvement of methods for testing and analyzing samples for chlorinated hydrocarbons; microanalysis of body fluids for beryllium; evaluation of arsenic exposures in insecticide plants; and determination of mercury, sulfur dioxide, acetaldehyde, fluorides, chromium, and cobalt. As funds permit, the agencies are installing in their laboratories specialized equipment, such as spectrographs, polarographs, and X-ray diffraction apparatus, enabling them to do highly specialized analyses on crystal structure and trace elements.

Occupational Disease Reports

Reports of suspected or confirmed cases of occupational illness serve as a valuable source to industrial hygiene divisions for investigating existing health hazards. The value of such reports to workers and employers is illustrated by the account of a follow-up of two cases of lead poisoning reported in a ceramics plant employing 350 workers. The industrial hygiene division which investigated the report learned from interviews with physicians attending the patients and other community physicians that there were several other cases which had not been reported as being of industrial origin. At the same time, a community chest X-ray survey uncovered several cases of silicosis with histories of employment at the plant. Technical studies by the local industrial hygiene division revealed that practically every production employee was exposed to severe silicosis or lead poisoning

Table 2. *Occupational disease reports received by industrial hygiene agencies in 18 States*

Cause	Number of cases
Poisoning due to:	
Metals:	
Arsenic	4
Cadmium	21
Lead	257
Mercury	4
Zinc	10
Metal fumes	7
Copper	3
Solvents:	
Benzol	25
Carbon tetrachloride	16
All other solvents	7
Gases:	
Carbon monoxide	65
Chlorine	31
Hydrogen fluoride	2
Phosgene	10
Methyl chloride	2
Gases not specified	24
Dusts:	
Silicosis	979
Silico-tuberculosis	33
Asbestosis	2
Byssinosis	2
Pneumoconiosis, not specified	270
Systemic poisoning, not specified	1, 228
Chemical poisoning, not specified	186
Dermatitis, skin diseases	18, 288
Conjunctivitis	4, 893
Pulmonary and bronchial affections	1, 616
Pulmonary tuberculosis	67
Inflammatory conditions due to repeated motion, pressure, or shock	2, 380
Heat exhaustion	112
Anthrax	8
Undulant fever	178
Nasal ulceration	137
Miscellaneous and not specified	533
Total	31, 400

hazards of which management was not aware. As a result of these studies, the company installed dust control equipment worth thousands of dollars. A workers' health service, with a registered nurse in charge was also inaugurated in order to prevent further occurrence of occupational illness. This is an account of one case. There are other instances similar to this one.

The situation regarding the reporting of occupational diseases in the country, as determined from available reports, shows little improvement. A summary of the number of cases by cause, reported to industrial hygiene divisions in 18 States, is shown in table 2. A total of 31,400 cases of suspected or actual illness was reported for the annual period. Dermatitis continues to be the leading occupational disease reported, accounting for over one-half of the 31,400 cases listed. However, it is difficult to draw any conclusions from the table on the occurrence of specific industrial diseases, owing to differences in classifying diseases. The summary is merely a combination of individual lists of cases compiled by the agencies, which sometimes gave specific causes and other times only broad categories.

Many divisions have taken definite measures to stimulate the reporting of occupational illness from all sources, but they likewise report that progress is slow. Even where regulations and statutes exist, the reporting of cases to State boards of health is still notoriously poor. Only five percent of the cases listed in table 2 represent reports made to boards of health. The remaining 95 percent consist of reports of claims submitted for compensation or morbidity reports made to compensation agencies and referred to industrial hygiene divisions.

Educational Activities

Each agency devotes considerable effort to informing labor, industry, civic and professional groups on different phases of industrial health. Various media, such as bulletins, posters, radio, exhibits, films and institutes, are utilized in furthering these informational and educational activities.

Numerous divisions publish their own news bulletins which are distributed to industry and other interested persons and organizations. In the past year, they prepared and issued bulletins on special subjects such as silicosis, carbon monoxide hazard in garages, manuals on records for plant nurses, and laboratory procedures. One division has just completed a manual on ventilation in industrial establishments. One of the West Coast States disseminated a series of informative bulletins on the subject of toxic insecticides. Another division published warnings for use of the public and responsible authorities on the effectiveness and hazards of ultra-violet and other air disinfectants now in vogue. These are only examples, but it may be seen that much of this informational service is directed at the public as well as labor and industry.

The contribution of industrial hygiene agencies to training of personnel is likewise substantial. The need for industrial hygiene personnel, coupled with limited formal educational facilities, makes it necessary that staff members assist with the teaching of industrial health subjects. Over one-half of the reporting agencies indicated activity in this field. In addition to lecturing and assisting with development of curricula, they make available their laboratory facilities for demonstration purposes, and arrange for in-plant orientation with appropriate industries. The practice of employing university—especially medical—students for part-time work or during their vacations is growing more popular. On this subject the West Virginia report makes the following comment: "As a result of this brief indoctrination into the field of industrial health, they have a better understanding of industrial health problems. In highly industrialized States, it appears very desirable that every medical student who plans to practice, whether as a private practitioner or industrial physician, should be given some training in industrial hygiene."

Cobalt and the Dust Environment of the Cemented Tungsten Carbide Industry

By Lawrence T. Fairhall, Ph. D., Robert G. Keenan, B. S., and Hugh P. Brinton, Ph. D.

While cobalt has long been known and used in industry, until recent years it occupied a very minor place, being used chiefly in producing colored glass and glazes. It therefore remained negligible as an economic factor, particularly in comparison with its far more important chemical ally, nickel. Cobalt has, however, been steadily gaining in industrial importance. In 1947—the last year for which we have official figures—the total cobalt consumption in the United States amounted to somewhat over 4,000,000 pounds (*1*) and was 2.8 percent that of nickel. Although the total amount of cobalt used annually in this country is still less than 3,000 tons, the consumption is very great in comparison with that of 25 years ago.

A substantial tonnage of cobalt is diverted to use in alloy steels, especially high-speed and corrosion-resistant steels of the cobalt-chromium-tungsten type which are known as stellite. In addition, cobalt is now being used in iron-free magnets of the alnico type, in the manufacture of cemented tungsten carbide tools and dies, and as a catalytic agent for synthesizing gasoline from coal by the Fischer-Tropsch process. The latter two uses are the more important from the point of view of industrial exposure, since significant amounts of dust are engendered in the processing involved.

So far as we are aware, the recently completed field investigation of the cemented tungsten carbide industry made by the Division of Industrial Hygiene of the Public Health Service is the first survey in industry to be made of atmospheric cobalt concentrations. The plants engaged in the production of cemented tungsten carbide tools and dies are few in number and for the purpose of this survey, investigation was confined to three plants which employ the majority of workers in this industry.

The manufacture of cemented tungsten carbide tools and dies is a somewhat complicated and highly specialized type of manufacture. It is a comparatively new and rapidly growing industry. The extreme hardness of carbide-tipped tools enables machining operations to be carried out with a rapidity unapproached by the best of high-speed steel tools. The demand for this type of tool is therefore insistent and growing. To meet this demand, the carbide tool factories are

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rapidly growing also and, along with this expansion of facilities, various technical improvements have been and are being made. The problems of ventilation have also received attention, and it is usual to find each individual operation, from which dust may arise, carefully shielded or exhausted.

The manufacturing process may begin with the powdered metals, or, as in one plant, the raw materials or ores may be worked chemically and the reduced metals may be prepared in powdered form in the same plant.

The process of manufacture of tool tips and dies consists essentially in preparation of tungsten carbide which has a hardness approaching that of the diamond. To employ this usefully, it is necessary to bond the grains of tungsten carbide together in a metallic matrix which can then be attached to a steel shank or ring holding the tool or die. In practice, the carbides of other metals are used in addition to tungsten carbide. A typical commercial cemented tungsten carbide tool tip may therefore also contain titanium carbide or tantalum carbide with cobalt as the binder.

Tungsten carbide is produced by heating a metallic tungsten and carbon black mixture in a high-frequency vacuum furnace or in a resistance furnace in an atmosphere of hydrogen. Titanium and tantalum carbides are similarly prepared by heating the oxides of the metals with carbon black. Powdered cobalt metal and the proper proportions of carbides are ground in ball mills for long periods of time—as much as several days—to insure proper fineness and intimate mixing. This mixture is then pressed into blanks and presintered in hydrogen at about 1,000° C. which leaves the material sufficiently soft to be easily cut to approximate dimensions. Following this final shaping, they are sintered at a higher temperature of about 1,500° C. At this point the blanks are extremely hard and metallic in appearance. They are then brazed onto the steel shanks or holders and ground to final dimensions.

It is apparent that a substantial amount of dust will arise from working with these powdered metals, and in grinding and finishing the metal products. In most of the plants adequate ventilation is provided to meet the dustier operations and in some places the ventilation is very good. However, a certain amount of atmospheric contamination is inevitable. This survey was made to find the extent of dust contamination of the atmosphere and particularly the amount of cobalt present in the air at various operating areas.

In the initiation of the environmental sampling program, it was realized that wide plant-to-plant variations might be expected in the atmospheric dust concentrations produced by a given operation. An important factor contributing to this situation was the nature and proximity of the adjacent operations. It is essential to emphasize that the operations are rarely segregated into individual workrooms and that those operations which produce the largest quantities of dust are not necessarily in the same relative locations in all plants. From an environmental viewpoint, an individual operator is exposed not only to the dust produced by his own work but also to a proportion of that produced by adjacent activities.

Additional factors contributed to the anticipated plant-to-plant variations in dust concentrations at specific operations. Among these, special mention should be made of the individual plant structure, ventilation, the layout of machines and processes, and the segregation of the dustiest operations from the others. Finally, mention should be made of adequate or inadequate local exhaust ventilation.

Two simultaneous samples were taken at a designated point; one at the breathing level of the worker as he performed his duties in his normal manner; the other in the aisle between the machines or processes. In this way, the first sample represented the operator's exposure; the second, the exposure in the general atmosphere. Only one set of samples was taken at each location on a given day and the time of sampling of a specific operation was varied over the shift period until a total of ten samples was obtained—five of the operator's exposure and five of the general atmosphere. Samples were taken of every possible employee activity in the industry.

The choice of 10 samples per operation per plant was an arbitrary one, determined by a preliminary investigation of job break-downs, the statistical value of the results, and expediency of the environmental program. Long sampling periods were employed, usually 30 to 60 minutes, to provide ample material for subsequent chemical analysis and to compensate for most cyclic operations. To compensate for sampling errors, the instruments were alternated on a daily basis. The instrument which sampled operators' exposures on one day was used for taking general atmosphere samples on the next and vice versa.

Since the major atmospheric contaminants were finely divided solids, the instrument chosen for most of the sampling was a modified electrostatic precipitator. Because the efficiency of the electrostatic precipitator is dependent upon the voltage applied (*2*), special coils and other instrumental improvements introduced by Clayton (*3*) were utilized. This instrument was efficient and had a high sampling rate. Moreover, the firm retention of the deposited dust sample on the walls of each collecting electrode, during shipment to the laboratory, eliminated the need for the transfer of samples in the field (*4*).

The dust content of the sampling electrode tubes was obtained by careful weighing with all the analytical precautions necessary for weight determination of the magnitude of these dust samples. The dust was then transferred quantitatively to pyrex test tubes, 25 millimeters in diameter, by means of a rubber policeman and 30 percent ethyl alcohol. The samples were evaporated to dryness in an oven at 110° C. and were then ready for fusion. In determining the weight of the samples, the outer tube surfaces were cleaned and allowed to come to equilibrium with atmospheric moisture by standing for 15 minutes before each of the two weighings; the sample weights, i. e., total dust values, were obtained by the difference in tube weights before and after transferring the dust.

Owing to the very refractory nature of the cemented tungsten carbide dust, an oxidation fusion was necessary to break it down. The dust is insoluble in alkalies and mineral acids, and is not broken down by either alkaline or acid fusion. However, oxidation fusion with potassium persulfate, $K_2S_2O_8$, was found to be successful in decomposing this dust (*5*).

Two modifications of the Nitroso-R-Salt method for cobalt analysis were used. For the determination of the smallest amounts of cobalt, the sensitive method of McNaught was employed (*6*). This method was inapplicable to sample aliquot portions containing a greater quantity of cobalt than 0.05 milligram. Most samples contained such quantities of cobalt that the measurements of the minute aliquot amount of liquid necessary for the application of McNaught's procedure caused too great an error. This method, however, was used for the analysis of about 134 of the lightest samples at the initial stage of the laboratory investigation. It was then modified by combining with it the method of Young, Pinkney, and Dick (*7*). The resulting procedure was found to be satisfactorily applicable for cobalt determinations ranging from 0.01 to 0.50 milligram of cobalt (*8*).

The average concentration of dust and its cobalt content in the initial powder processing and in the tool and die operations (the two more important divisions of manufacture) are given in the table.

Examination of these values shows that, roughly speaking, the total dust in the general atmosphere is about 20 percent of that at the operator's exposure in the powder processing operation; the cobalt content in both exposure groups amounts to practically 10 percent of the total dust. In the case of tool and die operations, the dust content of the general atmosphere is about 50 percent that at the operator's exposure, while the cobalt content is about 5 percent of the total dust.

It should be emphasized that these are average figures. In some dusty operations, for instance in the calcination of cobalt nitrate in one plant, the total dust was as high as 123 milligrams per cubic meter while its cobalt content was 79 milligrams per cubic meter. Except for the dusty calcination operation, and in screening powders, weighing and milling, and in cleaning the mills, the usual exposure to dust and to cobalt is much lower. The lowest exposure at any point

Average dust and cobalt content of air in three cemented tungsten carbide plants in milligrams per cubic meter (based upon 977 analyses)

Plant	Operator's exposure		General atmosphere	
	Total dust	Total cobalt	Total dust	Total cobalt
	Powder processing			
A	14. 0	1. 67	3. 3	0. 12
B	13. 6	1. 05	2. 9	. 22
C	10. 6	1. 64	2. 0	. 16
	Tool and die operations			
A	5. 0	0. 23	2. 2	0. 07
B	1. 8	. 08	1. 0	. 03
C	1. 0	. 05	. 5	. 01

in the three plants was 3 or 4 micrograms of cobalt per cubic meter of air. It is apparent, therefore, that despite great care in controlling the amount of dust in the air of these plants, none of the workers quite escaped contact with cobalt dust.

It is significant that cobalt was invariably found in the atmosphere, even in places where no manufacturing operations were in progress, such as the office section. All individuals employed in the plants invariably breathed in some cobalt even though minute in amount. It should be noted, moreover, that ventilation was, in general, very thorough and that considering the type of manufacture, the plants were clean in appearance. The presence of cobalt was indicated only because of the extreme delicacy of the test applied in those areas where exposure was minimal.

Dust counts which were made on about 10 percent of the total number of samples taken were in general rather low. The average for all operations and all plants was 2.8 million particles per cubic foot. As might be expected, however, the powder processing proved the dustiest operation, while tool and die operations in general were the least dusty of the various stages of manufacture.

With such wide exposure to cobalt over such a range of concentration, it is of interest to consider the effects of inhalation of this dust or the dust of its compounds. Such effects have not been previously studied, although a certain amount of pharmacological data is available with reference to ingested cobalt compounds and to the intravenous injection of cobalt salts (*9*). While cobalt has been found to produce a certain amount of physiological response, the experimental work so far reported in the literature does not indicate that any great danger is associated with it. However, many seemingly inert substances have proved dangerous on inhalation and further experimental investigation with reference to this phase of the problem is now in progress in this laboratory.

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— Review of Bulletin 300 —

Ten Years of Federal Grants-in-Aid for Public Health

As taxable wealth of the Nation accumulates more and more in comparatively few urban areas, the mechanism of grants-in-aid is increasingly recognized as a workable method of reducing inequalities in opportunity. At the same time, the use of such grants to stimulate the development of new programs, particularly in areas with special problems, has continued.

Public health programs in the United States have benefited in great measure through this device. Grants-in-aid for such programs on a Nation-wide scale were first authorized in 1935 by Title VI of the Social Security Act, and became available in February 1936. Section 314 of the Public Health Service Act, passed in 1944, and later amendments, have further expanded the scope of Federal-State cooperation in health work.

"Ten Years of Federal Grants-in-Aid for Public Health" records briefly the experience of the Public Health Service in the allocation of grants-in-aid to the States from February 1936 through June 30, 1946. It outlines trends in State and local health department development during the same period, as indicated by data on finances, personnel, organizational changes, and activities, and traces the growth in the States of specific types of programs.

State and local appropriations have risen surprisingly during the period of Federal grants-in-aid. Increased funds, in turn, made possible the development of stronger health departments providing new and improved services. At the local level, the figures show growth in numbers of full-time county and district health departments, particularly the latter, and a two-fold increase in personnel employed, while municipal health departments have tended to combine with county units.

Among supplementary activities of the Public Health Service covered in the bulletin are the following: Emergency health and sanitation measures during World War II financed by special funds; investigations and studies of public health methods which prepared the way for a Nation-wide Federal-State cooperative program in public health; and demonstrations of diagnostic techniques in large-scale case-finding programs, of preventive techniques, and of administrative methods. The report also describes procedures developed in the course of allocating funds and carrying out related functions. Among such procedures are allotment formulas; the review of plans, programs, and budgets; and provision of consultation service.

In addenda, payments to States and other data for 1947 or 1948 are summarized. Developments in cancer control, mental health, hospital surveys and construction, water pollution, and heart disease, for all of which specific grants were authorized after June 30, 1946, are described in so far as available data permit.

The first recommendation of the authors is extension of public health services to cover the entire country. The second is the development of "health service areas"—with sound finances, qualified personnel, enrichment of programs, objective State-local allocation formulas, and simplification of records and reports.

The bulletin includes an extensive reference list for the use of those who may be interested in further study of either the various aspects of grants-in-aid or development of public health services.

Ten Years of Federal Grants-in-Aid for Public Health. By Joseph W. Mountin, Emily K. Hankla, and Georgie B. Druzina. Public Health Bulletin No. 300, 84 pp., U. S. Government Printing Office, 1949. For sale by the Superintendent of Documents, Washington 25, D. C. Price 25 cents.

— Examination —

Regular Corps Sanitarians

Competitive examinations will be held June 8, 9, and 10, 1949, for appointment of milk and food specialists and bacteriologists as sanitarians in the Regular Corps of the Public Health Service. Applications must be received no later than May 18.

Appointments will be made in the grades of assistant sanitarian (first lieutenant) and senior assistant sanitarian (captain).

An assistant sanitarian applicant (1) must be a citizen of the United States and at least 21 years of age; (2) have a bachelor's degree from a school of recognized standing in one or more fields in the biological, chemical, or physical sciences which, in the opinion of the examining board, are related to milk and food sanitation or bacteriology; (3) have a master's degree from an approved school in public health or in a science listed in (2) above; and (4) have at least 7 years of educational (exclusive of high school) and professional training and experience, including at least 1 year of experience which, in the opinion of the examining board, would qualify the candidate to perform the duties of an officer in either the milk and food or bacteriology fields. A senior assistant sanitarian applicant, in addition to the first three requirements listed for the assistant grade, must have at least 10 years of educational (exclusive of high school) and professional training and experience.

The written examinations for the different grades will cover the following subjects:

Senior assistant sanitarian (milk and food)—Milk and food sanitation; general sanitation; public health background, methods and procedures. The assistant sanitarian examination will cover, in addition, elementary material relevant to milk and food, in the basic sciences, chemistry, physics, mathematics, biology, and bacteriology.

Senior assistant sanitarian (bacteriology)—General bacteriology; bacterial metabolism, mycology, and virology; systematic bacteriology; infection and resistance, and sanitary and applied bacteriology. The assistant sanitarian (bacteriology) examination will cover, in addition, elementary material relevant to bacteriology in the basic sciences, chemistry, physics, mathematics, and biology.

Entrance pay for an assistant sanitarian with dependents is $3,811 per annum; for senior assistant with dependents, $4,489. These figures include subsistence and rental allowance.

Application forms and additional information may be obtained by writing to the Surgeon General, Public Health Service, Washington 25, D. C. Attention: Division of Commissioned Officers.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MARCH 26, 1949

The incidence of measles increased during the week from a reported total last week of 28,054 cases to 33,347 for the current week, an increase of 19 percent, as compared with 15 percent for the corresponding week of 1946 (from 29,812 to 34,300). The comparable 5-year medians are, respectively, 21,613 and 22,266. Increased incidence (ranging from 249 cases in the New England area to 1,662 in the Middle Atlantic) was reported in all geographic divisions except the Mountain area. States reporting the largest increases are Texas (from 2,774 cases last week to 4,118), New York (2,156 to 3,177), Pennsylvania (2,417 to 2,936), Kansas (1,238 to 1,735), and Connecticut (531 to 916). The total reported since the first of the year is 251,151 cases, a larger number than reported for a corresponding period since 1944 (272,325). The 5-year median for the period is 175,422.

A total of 3,616 cases of influenza was reported, as compared with 3,780 last week and a 5-year median of 4,054. The 4 States reporting more than 142 cases (last week's figures in parentheses) are as follows: Texas 1,597 (1,517), South Carolina 558 (754), Arkansas 319 (265), Virginia 307 (288). The total for the year to date is 72,703, 5-year median 157,694.

Of 51 cases of poliomyelitis, California reported 10 (last week 11), West Virginia 6 (last week 0), and New Jersey and Texas 5 each. Only 3 other States reported as many as 3 cases. To date 974 cases have been reported, same period last year 381, 5-year median 425.

During the week 2 cases of anthrax were reported, 1 each in Massachusetts and Oklahoma, and of 3 cases of smallpox 2 were reported in Texas and 1 in South Dakota.

Deaths recorded during the week in 94 large cities in the United States totaled 10,146 as compared with 9,799 last week, 9,703 and 10,841, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 9,703. The total for the first 12 weeks of the year is 118,822, as compared with 123,111 for the same period last year. Infant deaths during the week totaled 641, last week 676, 3-year median 681. The cumulative figure is 8,042, as compared with 8,357 recorded for the same period last year.

Telegraphic case reports from State health officers for week ended March 26, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [4]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	1		490	1	10			16				14	-
New Hampshire			1	40					5					
Vermont				284					11				5	
Massachusetts	8			1 158	5				257				85	
Rhode Island				321		6			5				5	
Connecticut			4	916	1	91			39				4	
MIDDLE ATLANTIC														
New York	8	3	(5)	3 177	7	341	2		• 304		1	1	111	10
New Jersey	4		17	1 366		74	5		154			1	39	4
Pennsylvania	4	1	(5)	2,936	7				316			4	67	1
EAST NORTH CENTRAL														
Ohio	5		6	434	2	58			389				65	26
Indiana	6		1	190	2	5			74		2	1	13	17
Illinois	1		25	101	10	126			191				47	3
Michigan •	1		19	710	3	50	3		426				11	
Wisconsin			32	1 700	5	17	1		90		1		21	2
WEST NORTH CENTRAL														
Minnesota	2			194	2	4			42				1	
Iowa	3			59		1			32					4
Missouri	5		8	499	2	22			45			3	4	
North Dakota			44	41					6					
South Dakota	1		1	15					4	1				
Nebraska	1		7	111		2			12			1	1	
Kansas	4		1	1 735	1	11			12				4	
SOUTH ATLANTIC														
Delaware				22			1		20				3	
Maryland •	2		2	1 255	2	47			• 49			1	9	
Dist of Col				94	1	8			10				2	
Virginia	2		307	1 201	4	74			19		1	4	19	1
West Virginia	19		60	201	4	7	6		14			1	9	
North Carolina	6			1 097	1		2		15			1	45	
South Carolina	7	1	558	499	2	201	1		6			2	26	1
Georgia			29	825	3	35			10		6	1	35	15
Florida	5	- --	20	114	1	25	2		9				10	

EAST SOUTH CENTRAL														
Kentucky	2	1	5	468	4	50			55			3	33	17
Tennessee	5		48	537	3	53			25		3		6	
Alabama	7		142	786	3	105			6				16	5
Mississippi [a]	3		51	233	1	20	2		7		4	2	9	
WEST SOUTH CENTRAL														
Arkansas	3		319	1 114		175	1		1		1	1	3	1
Louisiana	2		7	71	1	50			2		1	6	12	
Oklahoma			87	346	1	44	1		17				2	3
Texas	22		1 597	4 118	3	467	5		53	2		6	129	23
MOUNTAIN														
Montana			1	14					4				2	
Idaho	2		5	80		5	3		[c] 9				1	
Wyoming	1			34		6			5					
Colorado	1		20	407	1	29			12			1	2	
New Mexico		1	2	344		13			8				1	
Arizona		1	124	176		33	1		3			1	11	1
Utah [a]			4	75		2	1		4				26	-
Nevada														
PACIFIC														
Washington	2		1	411	1	3	3		34				11	
Oregon			29	515		41	1		18				27	
California	14		32	1 833	4	35	10		[c] 121			2	43	7
Total	159	9	3 616	33 347	88	2 346	51		2 966	3	20	43	989	
Median 1944 48	272	7	3 477	21 613	166		28		3 877	4	16	49	2 198	
Year to date 12 weeks	2 098	84	52 703	251 151	1 028	29 321	974	12	34 450	25	336	503	12 330	
Median, 1944-48	3 510	97	157 694	175 422	2 399		425	5	40 402	99	226	522	26,857	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 18		(11th) Mar 19		(32d) Aug 14	(35th) Sept 4		(11th) Mar 19	(39th) Oct 2	
Since seasonal low week	7 212		88 973	303 544	1 872		51		57 148	40		43	22,363	
Median, 1943-48	11 076		190 669	210 368	3 903		28		78 973	175		49	51,137	

---

[a] Period ended earlier than Saturday

[b] New York City and Philadelphia only respectively

[c] Including cases reported as streptococcal infections and septic sore throat

[d] Including paratyphoid fever reported separately as follows Virginia 2 North Carolina 1 Texas 2 California 2, salmonella infections, not included were reported as follows Massachusetts 1 Maryland 1

Anthrax Massachusetts 1 Oklahoma 1
Alaska Influenza 32 measles 4 meningitis 1 pneumonia 1
Territory of Hawaii Diphtheria 6 influenza 3 measles 272 poliomyelitis 1 scarlet fever 3

PLAGUE INFECTION IN UTAH AND WASHINGTON

Under date of March 23 plague infection was reported proved in fleas from rodents taken in Salt Lake County, Utah, and Kittitas County, Wash , as follows.

UTAH

Salt Lake County—A pool of 16 fleas from 1 ground squirrel, *Citellus variegatus*, shot March 11 at a gravel pit west of Heughs Canyon between Wasatch and Holaday Boulevards near Salt Lake City

WASHINGTON

Kittitas County—A pool of 200 fleas from 107 short-tailed meadow mice, *Lagurus curtatus*, trapped March 10 about 18 miles east of Ellensburg, and a pool of 225 fleas from 85 white-footed mice, *Peromyscus maniculatus*, trapped on the same date at the same location

DEATHS DURING WEEK ENDED MAR. 19, 1949

[From the Weekly Mortality Index issued by the National Office of Vital Statistics]

	Week ended Mar 19 1949	Corresponding week 1948
Data for 94 large cities of the United States		
Total deaths	9 799	10 045
Median for 3 prior years	10 045	
Total deaths first 11 weeks of year	108 076	113 408
Deaths under 1 year of age	676	649
Median for 3 prior years	624	
Deaths under 1 year of age first 11 weeks of year	7 401	7 669
Data from industrial insurance companies		
Policies in force	70 543 550	71 105 108
Number of death claims	13 535	1[illegible] 48
Death claims per 1 000 policies in force annual rate	10 0	11 4
Death claims per 1 000 policies, first 11 weeks of year annual rate	9 8	10 [illegible]

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 5, 1949.—During the week ended March 5, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		32	4	251	593	54	31	61	276	1 302
Diphtheria				12		1		1	1	15
Dysentery, bacillary				1		2				3
German measles				186	44	1	47	19	14	311
Influenza					31	2	9		1	43
Measles		162	276	154	294	186	80	273	286	1 659
Meningitis, meningococcal					3	1			1	5
Mumps		8	4	113	483	57	16	28	147	856
Poliomyelitis								1		1
Scarlet fever				89	107	2	2	10	21	231
Tuberculosis (all forms)		7	7	102	27	14	5		69	231
Typhoid and paratyphoid fever				5	1					6
Undulant fever					1	1			1	3
Venereal diseases										
Gonorrhea	2	14	1	67	49	33	17	41	60	284
Syphilis		13	6	83	32	4	[illegible]	4	10	165
Other forms									2	2
Whooping cough				36	23	7	[illegible]			173

MAURITIUS

Poliomyelitis—Information dated March 5, 1949, states that a serious epidemic of poliomyelitis has been prevalent in the Colony of Mauritius in recent months The increase in incidence was noted toward the end of November 1948 During the period November 20, 1948, to February 5, 1949, 470 cases were reported in the Colony. Statistical analysis indicates that more than 80 percent of the reported cases occurred in the age group from birth to 4 years The death rate is stated to be lower than that of the last previous outbreak (in 1945).

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases except yellow fever, in localities which had not recently reported cases All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month

PLAGUE

Ethiopia—*Correction*· The report of 9 cases of plague during the week July 12–19, 1948, in Shoa Province, Ethiopia (see Public Health

Reports for January 28, 1949, p. 116) was in error. Later information states that these cases were bronchopneumonia.

Indochina (French)—Cambodia—Pnom-Penh.—During the week ended March 12, 1949, 5 cases of plague were reported in Pnom-Penh in the State of Cambodia, French Indochina.

Portugal—Azores—St. Michaels Island.—During the period January 9–February 5, 1949, 2 cases of plague (1 fatal) were reported in Rabo de Peixe, Ribeira Grande, St. Michaels Island, Azores, Portugal.

SMALLPOX

Arabia—Aden Protectorate—Makalla.—During the week ended March 19, 1949, 6 cases of smallpox were reported in the port of Makalla, Aden Protectorate, Arabia.

India—Ahmedabad.—For the week ended March 5, 1949, 72 cases of smallpox with 54 deaths were reported in Ahmedabad, India.

Indochina (French)—Tonkin.—During the week ended March 12, 1949, 141 cases of smallpox with 40 deaths were reported in Laokay District, Tonkin State, French Indochina.

Turkey.—During the period January 1–31, 1949, 33 cases of smallpox were reported in Turkey.

TYPHUS FEVER

Belgium.—On March 14, 1949, 1 case of typhus fever was reported in Sprimont, Liege Province, Belgium. The report stated that this case was probably imported from occupied Germany.

Pakistan.—Information dated March 23, 1949, states that a recent outbreak of typhus fever in Dera Ghazi Khan District, West Punjab Province, Pakistan, has been brought under control. Up to March 9, 1949, 89 cases of the disease had been reported, 25 of which had proven fatal.

YELLOW FEVER

No reports of yellow fever were received during the current week.

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The PUBLIC HEALTH REPORTS is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The PUBLIC HEALTH REPORTS, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

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Q Fever Studies in Southern California

III. Effects of pasteurization on survival of *C. burneti* in naturally infected milk

By R. J. Huebner, M. D., W. L. Jellison, Ph. D., M. D. Beck, and F. P. Wilcox, D. V. M.*

The first report in this series (*1*) described the recovery of *Coxiella burneti* (*Rickettsia burneti*) from the pooled raw milk of four dairies in Los Angeles County. Subsequent studies of 63 dairies in the same area have shown that the pooled raw milk of 40 dairies contained sufficient *C. burneti* to readily infect guinea pigs on intraperitoneal or subcutaneous injection.

The second report in this series described epidemiological observations on 300 cases of Q fever (*2*). In that study, it was found that 68 percent of the infected persons did not use raw milk in their households. Although this observation seemed to eliminate the household use of raw milk as a mode of infection in two-thirds of the cases, it by no means eliminated the use of raw milk as a factor in the remaining third. The 32 percent of the cases which used raw milk may be compared to the less than 5 percent of the general population who are known to use raw milk in the Los Angeles area. Furthermore, it should be pointed out that case finding to date may have been influenced to some degree by selection on the basis of occupation and residence.

The resistance of *C. burneti* to heat has been found to be much greater than that of the other rickettsias and to exceed that of most vegetative bacteria (*3*). This observation suggested that pasteurized milk and milk products prepared from pasteurized milk must be investigated as potential sources of Q fever infection.

The purpose of the third report in this series is to describe five controlled experiments in which the effects of two methods of pasteuriza-

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*Laboratory of Infectious Diseases, National Institutes of Health, Public Health Service, Bethesda, Md.; Rocky Mountain Laboratory, National Institutes of Health, Public Health Service, Hamilton, Mont.; California State Department of Public Health, and Section of Dairies and Dairy Products, Los Angeles County Health Department, respectively.

tion on the survival of *C. burneti* in naturally infected milk were investigated. Four separate rigidly observed and controlled tests of the efficiency of each method (holding vat, and high temperature short time—HTST) were completed in the five experiments. The results of infectivity tests of market milk pasteurized in holding vats at 36 dairies are also given.

Materials and Methods

The experiments were performed in two large milk processing plants A and B. In each plant the milk used in the studies consisted of 400 to 600 gallons of pooled milk from dairies "a" and "b." Composite milk specimens from each dairy had been found consistently on several previous occasions to contain sufficient quantities of *C. burneti* to readily infect guinea pigs.

Pasteurization Equipment

Standard holding vat pasteurizers without space heaters[1] but with vertical mixing coils were used in both plants. The Cherry-Burrell HTST pasteurizer was employed at plant A, whereas the Creamery Package HTST pasteurizer was used at plant B.

Milk Supplies

The milk supplies used in experiments I, II, and V represented the morning and evening milk of 90 to 100 cows from dairy "a". At least 13 of these cows were found shedding *C. burneti* in milk about 2 months before these experiments were performed. The milk used in experiments III and IV represented the entire daily output of 90 cows from dairy "b," approximately 20 percent of which were positive in the complement fixation test for serum antibodies against Q fever. The milk was collected at each dairy in the customary manner [2] in 10-gallon cans and taken over the shortest possible route by truck (requiring 1 to 2 hours) to bottling plants A and B. At plant A the experiments were performed immediately after the evening milk of dairy "a" arrived at the plant. The morning milk supply from this dairy was kept at 40° to 43° F. until mixed with the evening milk supply when it arrived at the plant.

At plant B the experiments were performed immediately upon arrival of the morning milk shipment from dairy "b," at which time it was mixed with the milk shipment of the previous evening which had been stored at 40° to 43° F. during the night.

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[1] Milk ordinance and code Public Health Bulletin No 220, 1939. Space heaters are not required by the Agricultural Code of California and are not generally used in Los Angeles

[2] The milk drawn from the cows was promptly cooled to a temperature below 50° F. by pouring over standard cooling equipment. Although all cans were not tested, temperatures of those which were tested did not exceed 43° F. At dairy "a" the cans of cooled milk were placed in a cold room (temperature 40° F.) for several hours before shipment. At dairy "b" arrangements had been made for the delivery truck to arrive at the dairy as soon as all the milk had been placed in cans. This is the usual procedure at this dairy which does not have a cold room.

Pasteurization Procedure

A standard procedure was designed and closely followed in each of the experiments. Prior to the pasteurizing process, the holding vats, collecting vats, pipes, and other equipment coming in contact with milk, except the HTST pasteurizers, were cleaned and subjected to live steam for 30 minutes. The HTST pasteurizer in each instance was cleaned and further treated with a chlorine solution containing several times the amount of free chlorine usually used. The solution, in turn, was fully eliminated by flowing warm water. From 400 to 600 gallons of milk were used in the experiments, depending on the amount of milk required to fill completely the holding vat pasteurizer which was also employed as a mixing vat. After 10 minutes of thorough mixing, 100 to 200 gallons of milk were routed through the HTST pasteurizer and from there, following pasteurization, to a collecting vat where the milk again was thoroughly agitated and mixed. Following completion of the HTST test the remaining milk (300 to 400 gallons) was then pasteurized directly in the holding vat where the milk had been placed originally. The operation of each pasteurizer during the experiments was regulated and observed by at least three milk inspectors representing the State, city, and county health departments.[3]

Pasteurization Temperature Curves

The temperatures were controlled within expected limits, except in experiment I when after completing the HTST part of the experiment insufficient milk was retained in the holding vat to control temperature variations.[4] In no experiment did the temperature drop below the minimum legal requirements.[5] In each of the four experiments with the HTST equipment the temperature was held for 15 seconds at 160.5° F. with a maximum variation of +0.3° F. except in experiment IV when the temperature increased for a period of less than 2 seconds to 161.5° F. Temperature curves in each holding vat pasteurization experiment were checked by thermographic records and by constant observation of thermometers immersed in the body of milk. The temperature curves of the HTST experiments were recorded exclusively on thermographs.

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[3] The operations in the plant were supervised by H C McCausland of the California State Department of Agriculture, Jack Covert and Mark Howlett of the Los Angeles City Health Department, and Dr F P. Wilcox of the Los Angeles County Health Department. Dr Jacob Traum of the University of California School of Veterinary Science assisted in planning and observing the experiments.

[4] This part of experiment I was not completed but was repeated successfully in experiment V.

[5] California law requires a minimum temperature of 143° F for 30 minutes for the holding vat and a minimum temperature of 160° F. for 15 seconds for the HTST method

The temperature curves for the holding vat experiments are shown in table 1. The temperature was held at 143° F. with less than +0.5° F. variation for exactly 30 minutes in each experiment. However, the time lag required to bring the milk up to 143° F. was somewhat longer in each experiment than usually occurs in commercial pasteurization. This increased lag was the result of deliberate attempts to prevent excessive variation during the critical initial period when the temperature first reached 143° F.

Table 1. *Temperature curves of four milk pasteurization experiments in the holding vat*

Experiment number	Temperature of milk at start of experiment	Time lag to 143° F. (minutes)	Time lag between 140° F. to 143° F. (minutes)	Time held at 143° F. (minutes)	Temperature variation from 143° F.
	° F.				
II	50	50	7	30	+0.05
III	[1] 60	55	10	30	+0.02
IV	[1] 63	55	15	30	0
V	45	47	5	30	0

[1] The temperature of the milk was raised to this level in the holding vat shortly before routing it through the HTST equipment in order to reduce fluctuations of temperature in the latter. "Raw" milk specimens were taken at the temperatures shown above.

Test Specimens

Specimens to be tested for *C. burneti* were collected as follows: Three wash-water specimens were collected in each of the experiments from the holding vat pasteurizer, the HTST pasteurizer, and the collecting vat. The specimens were collected at the end of the washing process in sterile 4-ounce screw-cap vials. The milk specimens were collected in 4-ounce screw-cap vials and in 1-quart mason jars, which were sealed and sterilized the day before the experiments were performed.

Raw milk specimens were taken from the holding vat after 10 minutes of thorough mixing of the milk shortly before the pasteurization tests were begun. Following pasteurization, milk specimens were taken from the collecting tank (HTST pasteurized specimens) and directly from the holding vat. Four-ounce and quart specimens were taken in duplicate, and the sealed jars containing hot milk were immediately placed in a pail of iced water and cooled to approximately 50° F. as required by the California agricultural code for commercial milk.

In experiments I and II, milk specimens were collected from the bottom outlet of each tank after several gallons of milk had been permitted to flow out. This technique was believed to be unwise, since raw and pasteurized milk escaped from the holding vat over the same route. This consideration apparently failed to influence the single vat experiment completed in experiment II. However, in experiments III, IV, and V, sterile one-pint dippers were used to obtain specimens from the central portion of milk in each of the tanks.

Processing and Testing of Specimens at the Q Fever Laboratory

In each instance when the work of collecting and cooling specimens at the bottling plant was completed, the specimens were kept iced and taken to the Q Fever Laboratory,[6] where they were processed for inoculation in experimental animals both at that laboratory and at the National Institutes of Health, Bethesda, Maryland.

Twenty cc. amounts of milk and wash water were distributed by means of sterile pipettes from one of each of the specimen jars into at least four 30 cc. sterile screw-cap vials. Three vials representing each specimen were promptly frozen in dry ice. Five cc. of milk from each specimen were injected intraperitoneally in each of three guinea pigs. Similar amounts of wash-water specimens were also injected in two guinea pigs. At the field laboratory 90 to 100 cc. of each pasteurized milk specimen were centrifuged at 4,000 r. p. m. for 1 hour. The resulting sediments resuspended in 15 cc. of saline were divided and injected in three guinea pigs. Unopened duplicate milk specimens in quart jars were placed in the refrigerator in an upright position at 40° F. for approximately 12 hours, following which the cream was removed by pipette and placed in 20 cc. amounts in 1-ounce vials and then handled exactly as the whole milk specimens described above. Since spontaneous infections are known to occur in guinea pigs (*4*), uninjected animals were added to each cage as controls.

Tests at the National Institutes of Health

Specimens identical to those injected at the Q Fever Laboratory (except sediments) were shipped in dry ice by air express to the National Institutes of Health where they were kept in the frozen state until injected in laboratory animals. Guinea pigs were injected intraperitoneally with 3 cc. quantities instead of the 5 cc. amounts used at the Q Fever Laboratory. Uninjected controls were again added to each group of test guinea pigs.

Guinea Pig Inoculations

Male guinea pigs weighing 500 to 800 grams were used at both laboratories. Rectal temperatures were taken each morning on all guinea pigs. Although control guinea pigs in several experiments developed fever during the observation periods, it could not be shown that this evidence of intercurrent infections in the guinea pigs influenced the results of the experiments. The presence or absence of infection with *C. burneti* was determined by the presence or absence of specific antibodies against Q fever in the blood serum of guinea pigs 30 to 38 days after injection. The complement fixation test has been found, on extensive testing at the National Institutes of Health, to represent an accurate index of infection among guinea pigs. Because of its simplicity and accuracy, it has been used in these studies in preference to the cross immunity tests. Although intercurrent infections will frequently produce fever in guinea pigs and occasionally invalidate an immunity test, no other infectious agent has been found to stimulate the specific complement-fixing antibodies produced by *C. burneti*. Furthermore, intercurrent infections appear to have little or no effect upon the production of such antibodies except as they may produce premature nonspecific deaths.

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[6] The Q Fever Laboratory, Hondo, Calif., is a temporary field laboratory supported as a cooperative undertaking by the Public Health Service, the California State Departments of Health and Agriculture, and the Los Angeles County and City Health Departments.

Additional evidence concerning infection in the guinea pigs was sought. One guinea pig in each group (except controls and guinea pigs injected with water) was sacrificed 12 to 16 days after injection. Gross autopsy findings were recorded at the Q Fever Laboratory, and second passages in guinea pigs were attempted with the autopsy tissues at the National Institutes of Health.

Mouse Inoculations

Limited numbers of mice were also injected with milk specimens at each laboratory. Although mice have been found susceptible and have been successfully employed in isolation attempts, little is known concerning the comparative value of mice as test animals for determining the presence of Q fever infection in milk. The primary purpose of the pilot-mouse experiments described in this report was to obtain information concerning the comparative sensitivities of a "mouse test" and the "guinea pig test." No attempts were made to establish strains in mice at either laboratory. Adult white and dilute brown agouti mice were injected intraperitoneally with 1 cc. of whole milk from some but not all of the experiments and placed in cages with two normal uninjected mice. Surviving mice were bled 30 days later Because of the small quantities available the mouse serums from each group were pooled when tested by complement fixation for antibodies against Q fever.

Analysis of Milk Specimens

Chemical and bacteriological analyses of raw and pasteurized milk specimens used in each experiment are shown in table 2. The butterfat fell within expected limits and bacteria counts were not abnormal. The phosphatase test indicated that adequate pasteurization was accomplished in each experiment. However, the test was performed only upon the specimens taken from the body of the milk. No attempt was made to test foam or swabbings from the inner walls of the vat pasteurizers.

Table 2 *Chemical and bacteriological analysis [1] of the milk used in each experiment*

Experiment	Milk specimens tested	Bacterial counts	Butterfat	Acidity	Phosphatase test
I Dairy a	Raw milk	400	4.3	0.07	Positive
	HTST	300	4.3	.07	Negative
II Dairy a	Raw	2500	4.0	Not done	Positive
	Vat	900	3.7	Not done	Negative
	HTST	1200	3.9	Not done	Do
III Dairy b	Raw	11000	3.5	0.075	Positive
	Vat	2300	3.6	.075	Negative
	HTST	2200	3.6	.08	Do
IV Dairy b	Raw	5900	3.8	.13	Positive
	Vat	3200	3.8	.13	Negative
	HTST	5100	3.8	.13	Do
V Dairy a	Raw	Not done	Not done	Not done	Positive
	Vat				Negative

[1] These tests were performed in the laboratories of the Los Angeles County Health Department under the direction of Dr R V Stone

Results in Guinea Pigs

Protocols of the five experiments showing results obtained in guinea pigs are given in tables 3 to 7 Since in all the experiments injections of milk, cream, and sediment specimens gave results which were similar in all respects, the tables do not show this breakdown Some of the guinea pigs which were injected did not survive to be tested in the complement fixation test A few died before bleeding and others were autopsied following which tissues were either passed into other guinea pigs or frozen for possible future use

Table 3 *Pasteurization experiment 1 Results in guinea pigs injected at 2 laboratories*

Laboratory and date specimens injected	Specimens injected	Number guinea pigs injected	Number guinea pigs developing fever	Number positive [2] in complement fixation test	Number negative [2] in complement fixation test	Number not tested in complement fixation test	Comment on guinea pigs not tested by complement fixation
Q Fever Laboratory Nov 26 1947	Raw milk	9	8	4	1	4	2 died on 19th and 20th days 1 passed 2d passage positive for Q fever 1 autopsied 17th day Spleen enlarged
	HTST pasteurized milk	9	1	0	6	3	3 autopsied 1 on 18th day Spleen normal
	Wash water	6	1	1		0	
	Controls	6	0	0	6	0	
National Institutes of Health Dec 1, 1947	Raw milk	8	7	3	0	5	1 died on 4th day 4 autopsied 1 in moribund state 2 showed evidence of intercurrent bacterial infection
	HTST pasteurized milk	8	7	0	4	4	2 autopsied 2d passage negative 2 autopsied and not passed
	Wash water	12	3	0	11	1	1 died on 20th day
	Controls	14	5	0	12	2	2 died on 9th and 25th days respectively

[1] Guinea pigs with morning rectal temperatures greater than 39.5° C on one or more days during the observation period except the day after injection

[2] Guinea pigs were bled 30 to 38 days after injection

Table 4. *Pasteurization experiment II Results in guinea pigs injected at 2 laboratories*

Laboratory and date specimens injected	Specimens injected	Number guinea pigs injected	Number guinea pigs[1] developing fever	Number positive[2] in complement fixation test	Number negative[2] in complement fixation test	Number not tested in complement fixation test	Comments on (col 7) guinea pigs not tested by complement fixation
Q Fever Laboratory Nov 27 1947	Raw milk	6	6	3	1	2	1 autopsied 19 days after injection Spleen 3× normal 1 died 9 days after injection. Spleen normal
	Vat pasteurized milk	9	2	0	7	2	1 died 19 days after injection Spleen normal—pneumonia 1 autopsied 19th day Spleen normal
	HTST pasteurized milk	8	4	0	6	2	2 autopsied 19 days after injection Spleens normal
	Wash water	6	2	0	6	0	
	Controls	7	0	0	7	0	
National Institutes of Health Dec 17 1947	Raw milk	6	6	5	1	0	
	Vat pasteurized milk	6	0	0	4	2	1 autopsied on 16th day Passage negative 1 died on 22d day
	HTST pasteurized milk	3	2	0	1	2	1 died 21st day Spleen covered with nodules 1 autopsied on 16th day Passage negative
	Wash water	6	0	0	6	0	
	Controls	6	0	0	5	1	1 died on 22d day

Guinea pigs with morning rectal temperatures greater than 39 5° C on one or more days during the observation period except the day after injection

[2] Guinea pigs were bled 30 to 38 days after injection

Table 5 *Pasteurization experiment III Results in guinea pigs injected at 2 laboratories*

Laboratory and date specimens injected	Specimens injected	Number guinea pigs injected	Number guinea pigs[1] developing fever	Number positive[2] in complement fixation test	Number negative[2] in complement fixation test	Number not tested in complement fixation test	Comments on (col 7 guinea pigs not tested by complement fixation
Q Fever Laboratory Dec 3 1947	Raw milk	6	5	5	1	0	
	Vat pasteurized milk	9	1	0	6	3	3 autopsied on 18th day Spleens normal
	HTST pasteurized milk	9	4	0	6	3	2 autopsied on 18th day Spleens normal 1 autopsied on 18th day Spleen 2× normal
	Wash water	6	2	0	6	0	
	Controls	8	3	0	8	0	
National Institutes of Health Dec 1 1947	Raw milk	6	6	4	0	2	2 passed—2d passage positive for Q fever
	Vat pasteurized milk	6	0	0	3	3	1 autopsied on 18th day 1 passed on 17th day—2d passage negative 1 died on 17th day
	HTST pasteurized milk	6	1	0	3	3	1 died on 18th day 2 autopsied on 18th day 1 passed—2d passage negative
	Wash water	6	3	0	6	0	
	Controls	6	0	0	6	0	

[1] Guinea pigs with morning rectal temperatures greater than 39 5° C on one or more days during the observation period except the day after injection

[2] Guinea pigs were bled 30 to 38 days after injection

Table 6. *Pasteurization experiment IV. Results in guinea pigs injected at 2 laboratories*

Laboratory and date specimens injected	Specimens injected	Number guinea pigs injected	Number guinea pigs developing fever[1]	Number positive[2] in complement fixation test	Number negative[2] in complement fixation test	Number not tested in complement fixation test	Comments on (col 7) guinea pigs not tested by complement fixation
Q Fever Laboratory Dec 5 1947	Raw milk	9	7	6	0	3	1 died on 13th day Spleen 3X normal 1 autopsied on 18th day Spleen 4X normal 1 autopsied on 18th day Spleen normal
	Vat pasteurized milk	8	0	0	5	3	3 autopsied on 18th day Spleens normal
	H T S T pasteurized milk	9	0	0	6	3	2 autopsied on 18th day Spleens normal 1 died in 3 days peritonitis
	Wash water	6	1	0		1	1 died in 3 days peritonitis
	Controls	10	1	0	9	1	1 autopsied on 18th day Spleen normal
National Institutes of Health Dec 12 1947	Raw milk	6	5	4	0	2	2 passed in 12 days 2d passage positive
	Vat pasteurized milk	6	2	0	3	3	1 autopsied on 18th day 1 died on 18th day 1 passed on 17th day 2d passage negative
	H T S T pasteurized milk	6	1	0	4	2	1 autopsied on 18th day 1 passed on 17th day 2d passage negative
	Wash water	6	0	0	6	0	
	Controls	6	1	0	6	0	

[1] Guinea pigs with morning rectal temperatures greater than 39.5° C on 1 or more days during the observation period except the day after injection
[2] Guinea pigs were bled 30 to 38 days after injection

Table 7 *Pasteurization experiment V Results in guinea pigs injected at 2 laboratories*

Laboratory and date specimens injected	Specimens injected	Number guinea pigs injected	Number guinea pigs developing fever[1]	Number positive[2] in complement fixation test	Number negative[2] in complement fixation test	Number not tested in complement fixation test	Comments on (col 7) guinea pigs not tested by complement fixation
Q Fever Laboratory Dec 9 1947	Raw milk	6 [3]6	6 Not taken	4 5	0 0	2 1	2 died on 15th day Spleen 4X normal 1 died on 6th day pneumonia
	Vat pasteurized milk	9 [3]6	4 2	1 0	4 6	4 0	3 autopsied on 16th day Spleens normal 1 died on 26th day Spleen normal
	Wash water	2	0	0	2	0	
	Controls	5 4	1 0	0 0	5 4	0 0	
National Institutes of Health Dec 12 1947	Raw milk	6	5	5	0	1	1 died on 19th day No observation recorded
	Vat pasteurized milk	9	3	2	7	0	
	Wash water	3	0	0	3	0	
	Controls	5	0	0	5	0	

[1] Guinea pigs with morning rectal temperatures greater than 39.5° C on one or more days during the observation period except the day after injection
[2] Guinea pigs were bled 30 to 38 days after injection.
[3] Specimens injected into guinea pigs on Jan 24, 1948

Summarized in table 8 are the results of complement fixation tests on the serums of guinea pigs which survived injection with specimens from five experiments. Of 52 guinea pigs injected with raw milk, 48, or 92.3 percent, were positive in the complement fixation test at a serum dilution of 1 to 64 or greater. All 36 guinea pigs injected with HTST pasteurized milk were negative at a dilution of 1 to 8. Of 48 guinea pigs injected with vat pasteurized milk 3, or 6.2 percent, were positive. All 3 of the "positive" guinea pigs occurred among 20 which were tested following injection with vat pasteurized milk in experiment V (table 7). One of these was tested at the Q Fever Laboratory and two were tested at the National Institutes of Health. Each of the three "positive" guinea pigs had febrile reactions with onsets 8, 10, and 14 days, respectively, after injection. Three of the seventeen "negative" guinea pigs injected with the same specimen also developed fever but in one the fever began on the day after injection and was limited to a single day in the other two. Three other guinea pigs also showed fever but did not survive to be tested for serum antibodies against Q fever.

Table 8. *Summary of complement fixation tests on guinea pigs used in 5 pasteurization experiments at 2 laboratories*

Material injected	Number guinea pigs	Number positive [1]	Percent positive [1]
Raw milk	52	[1] 48	92.3
HTST pasteurized milk	36	[2] 0	0
Holding vat pasteurized milk	48	[1] 3	6.2
Wash water	57	[1] 1	1.7
None (controls)	73	0	0

[1] All positive serums revealed titers greater than 1:64

[2] 0=Negative at a dilution of 1:8

No satisfactory explanation was found to account for the occurrence of antibodies in one guinea pig injected with wash water from the HTST pasteurizer (experiment I) and tested at the Q Fever Laboratory. Fifty-six other guinea pigs injected with wash water and 73 uninjected control guinea pigs were tested during the five experiments at both laboratories, and all were negative.

Five attempts to produce Q fever in second passage guinea pigs with tissues of guinea pigs injected with raw milk from experiments I, III and IV were in each instance successful. Eight similar attempts with pasteurized milk from experiments I, II, III, and IV were unsuccessful.

Retrospective attempts to establish strains from the pasteurized milk of experiment V several months after the original results were obtained were not successful. However, this was not unexpected since the specimens had been frozen and thawed several times and maintained at a freezing temperature greater than −10° C.

The febrile reactions observed in guinea pigs during the five experiments are shown in table 9. In a previous study (*1*) it was noted that 26 (90 percent) of 29 milk specimens infected with *C. burneti* produced fever in guinea pigs. Similarly in this study, 61 (89.7 percent) of 68 guinea pigs injected with raw milk developed febrile reactions (table 9). After pasteurization, milk injections produced fewer febrile reactions but the number of these reactions exceeded expected rates. However, febrile reactions during these studies were influenced to some extent by intercurrent infections since 14.3 percent of uninjected controls developed fever. That 20 of 58 (34.5 percent) guinea pigs injected with milk pasteurized in the HTST equipment developed febrile reactions was not accorded much significance since this high percentage was largely due to the fact that the guinea pigs used in experiment I at the National Institutes of Health showed a very high rate of intercurrent infections.

Table 9. *Febrile [1] reactions in test and control guinea pigs during 30 to 38 days' observation*

Material injected	Number guinea pigs	Number showing fever	Percent showing fever
Raw milk	68	61	89.7
HTST pasteurized milk	58	20	34.5
Holding vat pasteurized milk	68	14	20.3
Wash water	59	12	20.3
None (controls)	77	11	14.3

[1] Elevation of morning temperature above 39.5° C. for one or more days except the day after injection.

Results in Mice

The results of milk injection of mice in general were similar to those obtained in guinea pigs and further demonstrated the efficacy of

Table 10. *Complement fixation results on serums of mice bled 30 days after injection with raw and pasteurized milk specimens*

Laboratory	Experiment number	Serums of mice injected with raw milk		Serums of mice injected with vat pasteurized milk		Serums of mice injected with HTST pasteurized milk		Serums of uninjected control mice	
		Tested	Positive	Tested	Positive	Tested	Positive	Tested	Positive
Q fever laboratory [1]	II	2	0	2	0	2	0	5	0
	III	2	2	2	0	2	0	6	0
	IV	1	1	2	0	2	0	6	0
National Institutes of Health.[2]	II	2	2	---		--		1	0
	III	2	2	1	0	1	0	1	0
	IV	1	1	1	0	1	0	-	-
Total	---------	10	8	8	0	8	0	19	0

[1] Each serum specimen represents 1 or 2 mice.

[2] Each serum specimen represents pooled serums of 2 or 3 mice

pasteurization in eliminating *C. burneti* from milk. Of ten groups of mice injected at both laboratories with raw milk from three experiments, eight were positive when pooled serums representing each group taken 30 days after injection were examined in the complement fixation test for antibodies against Q fever (table 10). Sixteen groups of mice injected with vat and HTST pasteurized milk specimens were in every instance negative when similarly tested. Nineteen groups of uninjected controls were also negative. No difference was observed between the reactions of the two strains of mice (dba and Swiss). Unfortunately, specimens from experiment V were not tested in mice.

Tests of Market Milk Specimens

As a result of findings in experiment V, further tests of vat pasteurized milk appeared indicated. Thirty-two bottles of vat pasteurized whole milk and four bottles of vat pasteurized cream were obtained from Los Angeles markets and the standard amounts injected in guinea pigs at the Q Fever Laboratory. Three specimens of whole milk and one cream specimen produced serological evidence of Q fever in at least one of two guinea pigs.

Although the phosphatase test indicated that one of the "positive" milk specimens was not free of the phosphatase enzyme and therefore probably was not fully pasteurized according to regulations, the other "positive" specimens were negative in the phosphatase test and apparently were properly pasteurized.

Discussion

Recent and contemporary reports (*5*) have shown that Q fever is a disease entity of some consequence to man in this and other countries. Although most reported cases cannot be traced to personal or household use of infected milk, the demonstration of *C. burneti* infection in the mammary gland of cows (*1*), goats (*6*), and sheep (*6*) may indicate that milk represents a reservoir of Q fever infection. In previous but as yet unpublished work (*3*), it was found that *C. burneti* in laboratory suspensions (saline and skim milk) showed considerable resistance to heat; surviving a temperature of at least 60° C. for 30 minutes in sealed vials. Since this is only slightly below California minimum requirements[7] for the holding vat method of pasteurization and since this type of commercial pasteurization cannot provide assurance that each particle of milk is raised to the recorded temperature, additional work needs to be done in order to determine methods of pasteurization which are completely effective in eliminating *C. burneti* from milk.

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[7] Agricultural Code of California, September 19, 1947

Summary

Four rigidly observed tests of the holding vat and the high temperature fast time (HTST) techniques of pasteurization, as employed in the Los Angeles area were completed in five separate experiments. The presence or absence of infection was determined chiefly by serum reactions in the complement fixation test for Q fever shown by guinea pigs and mice 30 days or more after being injected with the milk specimens.

So far as could be determined by the methods available, milk supplies pasteurized in the HTST equipment were rendered free of infection, although the same milk in the raw state was shown in each instance to be highly infectious.

In three of the four vat pasteurization experiments using the holding vat without space heater, *C. burneti* apparently was eliminated from the infected milk supplies. However, the pasteurized milk from one of the four tests of the holding vat method produced antibodies against Q fever in 3 of 20 guinea pigs tested. Similarly 3 of 32 specimens taken from bottles of vat pasteurized market milk and 1 of 4 specimens of vat pasteurized market cream produced antibodies against Q fever when injected in guinea pigs.

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—Announcement—

Formation of the American Board of Preventive Medicine and Public Health, Inc.

The American Board of Preventive Medicine and Public Health, Inc., has been formed to further preventive medicine and public health and to issue to physicians certificates of special knowledge in this field.

Organization of the Board was accomplished by a nine-member committee appointed from five associations. Membership included three members appointed from the Section on Preventive and Industrial Medicine and Public Health of the American Medical Association; three appointed by the Executive Board of the American Public Health Association, and one each appointed by the Canadian Public Health Association, the Southern Medical Association, the Association of Schools of Public Health.

Three additional members of the Board, representing practitioners of the specialty preventive medicine and public health, were elected following incorporation.

The principal purposes of the board as defined in the articles of incorporation are:

1. To encourage the study, improve the practice, elevate the standards and advance the cause of preventive medicine and public health.
2. To grant and issue to physicians duly licensed by law to practice medicine certificates of special knowledge in preventive medicine and public health.

General Requirements for Certification

1. Moral and ethical standing in the profession satisfactory to the Board.
2. Graduation from a medical school in the United States or Canada approved by the Council on Medical Education and Hospitals of the American Medical Association, or from a foreign medical school satisfactory to the Board.
3. An internship of at least one year in a hospital approved by the Council on Medical Education and hospitals of the American Medical Association or in a foreign hospital satisfactory to the Board.
4. Licensure to practice medicine in the United States or the Dominion of Canada.
5. Special training in preventive medicine or public health which shall include:
    (a) A period after internship of not less than 6 years of special training, teaching or practice in preventive medicine and public health which must include (b) and (c).

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(b) Successful completion of at least one academic year of graduate study leading to the degree of Master of Public Health or an equivalent degree or diploma or an equivalent satisfactory to the Board.

(c) Field training or residency of at least 2 years of field experience in general public health practice which includes planned instruction, observation and active participation in a comprehensive, organized, public health program, one year of which may be an approved clinical residency in a field directly related to public health.

6. Limitation of practice to teaching or practice of preventive medicine or public health as a specialty.

The Founder's Group

The bylaws authorize the Board for a limited period of time to excuse from examination practitioners of preventive medicine or public health who have attained unquestioned eminence in the field. This has been so defined as to include professors and associate professors of preventive medicine or public health in medical schools approved by the Council on Medical Education and Hospitals of the American Medical Association or in schools of public health accredited by the American Public Health Association, or individuals who have been or are president of one of the sponsoring societies designated in the certificate of incorporation, or have had at least 10 years of distinguished service in the field of public health and are considered eligible by the Board. Applications for consideration as members of the Founder's Group must be received by July 1, 1950

Examinations

Examinations will be held from time to time and in various places depending upon need as indicated by applications received. It is expected that examinations will be held primarily in connection with the meetings of the American Public Health Association. The examination will consist of two parts:

Part one will consist of a comprehensive written examination designed to test the knowledge of the applicant in the general field of preventive medicine and public health. These examinations will be announced at least 60 days prior to the holding of the examinations. The written examination will be confined to one day. Part two will consist of the oral or practical examination which will be held on the day following the written examination. This examination will be held before two to four examiners, members of the Board or associate examiners. An endeavor will be made to adapt the details of the oral examination to each candidate's experience and practice.

The examiners will report orally upon each candidate to the assembled Board, after which the results of the examination will be considered jointly by the entire Board and the examiners. Final action of the Board will be based upon the candidate's ethical and professional record, training and attainments as well as on the results of his formal examination.

Applications

Each application for examination for certification shall be in writing signed by the applicant and shall be filed with the secretary* not less than 90 days prior to the date of examination. Application must be on prescribed application forms. The application must be accompanied by an application fee and two recent, clear, unmounted, autographed photographs of the applicant and by at least two letters from physicians duly licensed by law to practice medicine, stating in substance that in the opinion of the writer of such letter the applicant is eligible under the provisions set up by the Board.

Fees

The Board is incorporated as a nonprofit corporation and no member of the Board may receive any compensation. Minimum fees are specified, consistent with the cost of examination and certification. The total cost to the applicant is $50.

Application fee	$15

No application can be considered for classification and action by the eligibility committee unless accompanied by the application fee. The application fee is not refundable.

Certification fee	$35

This fee is payable when the candidate is notified of acceptance for examination or as a member of the Founder's Group. It is not returnable after the candidate has been officially accepted and notified by the eligibility committee to report for examination. All applications must be on the standard form and accompanied by the necessary documentation. No member of the Board is authorized to give informal opinions as to the eligibility of the candidates. The determination of eligibility will be made only by the eligibility committee after receiving full application information. All candidates must comply with Board regulations in effect for the year in which the examination is taken, regardless of when the original application was filed. Applicants declared ineligible for admission to examination may reopen their applications within 2 years of the filing date without payment of an additional application fee. Applicants declared eligible but who fail to exercise the examination privilege within 3 years of the date of the filing of the application are required to file a new application and to pay a new application fee.

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* Ernest L. Stebbins, M. D., 615 North Wolfe Street, Baltimore 5, Md.

Certification

Upon satisfactory completion of the examinations or in the case of the Founder's Group, upon the affirmative vote of the Board, a certificate will be issued to the effect that the person named has been found to be possessed of special knowledge in preventive medicine and public health. This certificate will be signed by the officers of the Board and shall have its seal affixed. Each certificate shall remain the property of the corporation, but each person to whom a certificate is issued shall be entitled to its possession until revoked. Any certificate issued by the Board may be revoked if evidence, satisfactory to the Board, is presented that the applicant was not eligible at the time of application, or made any misstatement or misrepresentation of facts or that his license to practice medicine has been suspended or revoked.

The Board was created in accordance with action of the Advisory Board for Medical Specialties and approved by the Council on Medical Education and Hospitals of the American Medical Association.

DEATHS DURING WEEK ENDED MAR. 26, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Mar 26, 1949	Corresponding week, 1948
Data for 94 large cities of the United States.		
Total deaths	10,146	9,703
Median for 3 prior years	9,703	
Total deaths, first 12 weeks of year	118,822	123,111
Deaths under 1 year of age	641	688
Median for 3 prior years	661	
Deaths under 1 year of age, first 12 weeks of year	8,042	8,357
Data from industrial insurance companies:		
Policies in force	70,534,114	71,146,501
Number of death claims	12,813	13,380
Death claims per 1,000 policies in force, annual rate	9.5	9.8
Death claims per 1,000 policies, first 12 weeks of year, annual rate	9.8	10.6

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 2, 1949

A net decline of 1,442 cases in the incidence of measles was reported—from a total of 33,347 last week to 31,905 currently. The 5-year (1944–48) median is 23,784, reported for the corresponding week last year. Decreases in 5 geographic areas, ranging from 453 in the South Atlantic to 754 in the Middle Atlantic, aggregating 3,040, were partly offset by increases reported in the New England area (from 3,209 last week to 3,670), the East North Central (3,135 to 3,539), the Mountain (1,130 to 1,340), and the Pacific (2,759 to 3,282). Of 24 States reporting more than 346 cases, 13 reported increases, the largest of which occurred in California (1,833 to 2,230), New Jersey (1,366 to 1,663), Wisconsin (1,700 to 1,951), Washington (411 to 651), and Massachusetts (1,158 to 1,391). The total to date is 283,056, 5-year median 199,206. Only 4 times in the past 13 years has the reported peak of weekly incidence occurred before the first week of April.

A total of 3,068 cases of influenza was reported, last week 3,616, 5-year median 2,770. Only Virginia (265), South Carolina (418), and Texas (1,495), reported more than 163 cases.

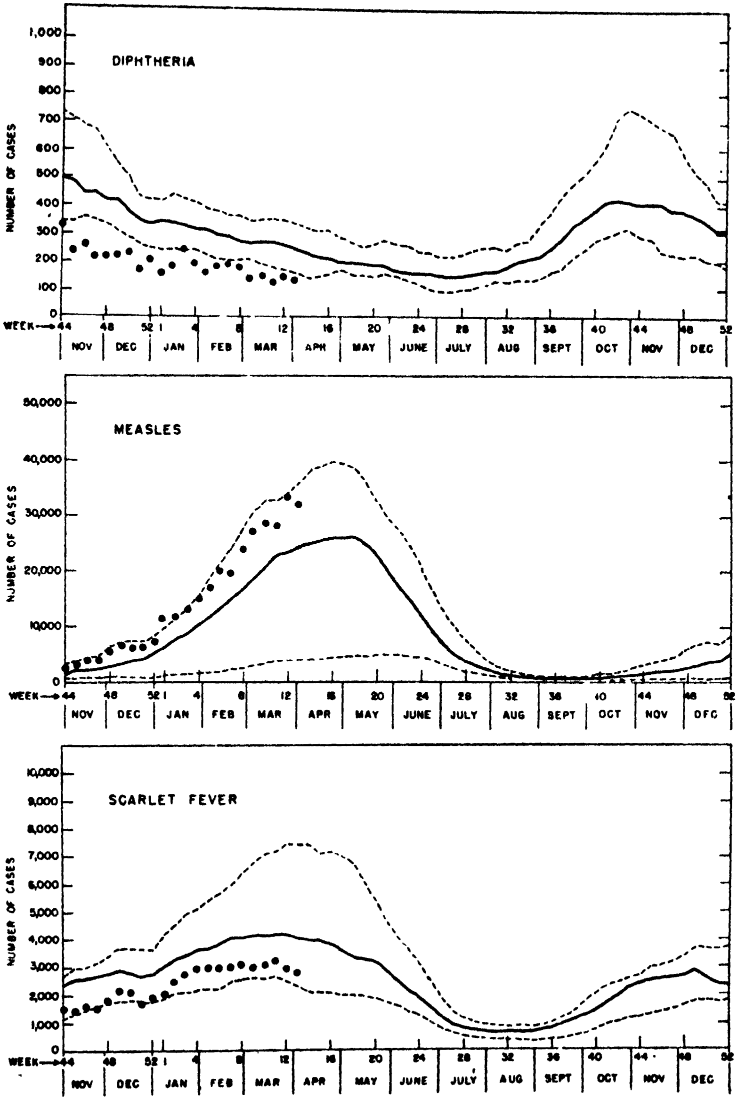
Of 43 cases of poliomyelitis, only 4 States reported more than 2 cases each—California 11, Texas 6, and Montana and Utah 5 cases each. The total to date is 1,016, 5-year median 453, corresponding period in 1947 (highest of the past 5 years) 667.

During the week 3 cases of anthrax were reported, 2 in New York and 1 in Massachusetts, and 2 cases of smallpox, 1 each in Mississippi and Texas. Since the first of the year 3 cases of smallpox formerly reported (1 each in Louisiana, South Dakota, and Wisconsin) have been canceled, leaving the corrected total to date 25, as compared with 33 for the same period last year and a 5-year median of 124.

Deaths recorded during the week in 94 large cities in the United States totaled 9,819, as compared with 10,146 last week, 9,742 and 10,248, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 9,742. The total to date is 128,641, as compared with 132,853 for the same period last year. Infant deaths totaled 654, last week 641, 3-year median 677. Cumulative figure, 8,696, same period last year 9,039.

Communicable Disease Charts

All reporting States, November 1948 through April 2, 1949



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is the median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1948.

Telegraphic case reports from State health officers for week ended Apr. 2, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Small pox	Tularemia	Typhoid and paratyphoid fever [4]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine			30	630		16			22			1	13	
New Hampshire			11	32		3			12					
Vermont				322					3					
Massachusetts	10			1 391					238			1	94	
Rhode Island				316		10			8				2	
Connecticut	1	1	5	979	1	67			32				4	
MIDDLE ATLANTIC														
New York	3	1	[5] 24	2 825	7	399			[3] 304			5	152	2
New Jersey	4		3	1 663	1	75	2		161			2	41	2
Pennsylvania	2	4	(5)	2 237	8				244			2	65	
EAST NORTH CENTRAL														
Ohio	2		1	567	4	52	2		404			2	69	25
Indiana	2	2	1	283	1	8			86		[6] 3	1	17	18
Illinois			22	127	3	364	1		140		1	1	32	1
Michigan [2]	1		7	611	4	99			430				22	
Wisconsin		2	32	1 951	1	13			63				15	
WEST NORTH CENTRAL														
Minnesota	5			125	2	24	1		73					
Iowa	1			83					13				2	10
Missouri	1		5	296		2			11		2		2	
North Dakota			11	38					4				9	
South Dakota				19	1				11	(7)				
Nebraska			18	88		2	1		5					-
Kansas	4			1 363		5			20				3	-
SOUTH ATLANTIC														
Delaware			1	19					25				2	
Maryland [2]	1		4	893		41	1		35				9	-
District of Columbia	1			161		23			10					-
Virginia	3		205	1 363	3	81			16			2	22	4
West Virginia	1		56	68		4			23				2	
North Carolina	5			979	2				13		2	1	19	
South Carolina	6	1	418	622	1	130			2			1	31	2
Georgia	3		22	634	4	153	1		10		5	4	4	15
Florida	6		2	116	2	16	1		4			4		1

EAST SOUTH CENTRAL														
Kentucky	3		1	250	7	27			37				14	13
Tennessee	5		94	587	5	90	2		28		2	1	24	
Alabama	10		163	634	2	73			17		1		2	12
Mississippi [a]	1		26	98		28	1		1	1		1	7	
WEST SOUTH CENTRAL														
Arkansas	4		118	1 051	1	62		(1)	8			3	8	4
Louisiana	4		5	40	2	24			4	(2)	1	5		3
Oklahoma			28	421		32			20		1		1	6
Texas	25		1 495	3 401	10	470	6		42	1	1	3	137	34
MOUNTAIN														
Montana			15	1	1		5		18				1	
Idaho	2		7	159		10			[c] 24			1	1	
Wyoming				8		9			2					
Colorado	10		45	411		21	1		12			1		
New Mexico			1	302		21			6		1		1	
Arizona	7		78	169		20			5			3	8	1
Utah [a]				60		6	5		9				6	
Nevada				8	1									
PACIFIC														
Washington	2		6	651	2	2			2				13	
Oregon			21	401		30	2		12				26	
California	11	5	17	2,230	6	34	11		[c] 87			2	50	6
Total	144	16	3 068	31 905	82	2 546	43		2 806	2	20	47	930	
Median 1944-48	250	8	2, 0	23 754	149		23		4 139	12	11	49	1 881	
Year to date 13 weeks	2 242	100	55 771	283 056	1 110	31 867	1 016	[1] 13	37 256	[2] 25	356	550	13 260	
Median, 1944-48	2 760	106	1 984	199 204	2,548		453	6	44 541	124	246	573	28,738	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(37th) Sept 18		(11th) Mar 19		(32d) Aug 14	(35th) Sept 4		(11th) Mar 19	(39th) Oct 2	
Since seasonal low week	7 356		92,041	335 449	1 954		94		59 954	[2] 40		90	23 293	
Median 1943-48	11 326		239 63	234 152	4 052		51		83,112	200		95	53 688	

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[a] Period ended earlier than Saturday

[b] New York City and Philadelphia only respectively

[c] Including cases reported as streptococcal infection and septic sore throat

[d] Including paratyphoid fever currently reported separately as follows Maine 1 New Jersey 2 North Carolina 1 South Carolina 1 Georgia 3 Texas 1 salmonella infections, not included were reported as follows New York 4

Anthrax Massachusetts 1 New York 2

[1] Rocky Mountain spotted fever Arkansas delayed report week ended Mar 19, 1 case

[2] Smallpox Deducted, Louisiana, week ended Feb 19, 1 case South Dakota, week ended Mar 5 1 case

Alaska No cases reported

Territory of Hawaii Influenza 36 measles 227 poliomyelitis 1

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 12, 1949.—During the week ended March 12, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		17	8	284	624	34	49	45	312	1,373
Diphtheria				18						18
Dysentery, bacillary				4						4
Encephalitis, infectious					1					1
German measles				230	54		130	15	8	437
Influenza		16			31	14				61
Measles		137	33	245	315	195	162	275	209	1,571
Meningitis, meningococcal			1		2	1			1	5
Mumps		21	6	177	386	54	42	32	90	808
Scarlet fever		6		104	121	1	2	8	4	246
Tuberculosis (all forms)		8	16	107	24	13	8	16	55	247
Typhoid and paratyphoid fever			3	8		2				13
Undulant fever				1	1					2
Venereal diseases:										
Gonorrhea		4	10	101	51	25	16	31	55	293
Syphilis		5	2	55	36	11	11	9	10	139
Whooping cough		16	2	147	19	4	13	5		206

JAPAN

Notifiable diseases—4 weeks ended February 26, 1949, and accumulated totals for the year to date.—For the 4 weeks ended February 26, 1949, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

Disease	4 weeks ended Feb. 26, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	1,605	161	3,473	392
Dysentery, unspecified	138	36	301	93
Gonorrhea	14,229		29,279	
Influenza	216		391	
Malaria	85		199	5
Measles	9,195		15,406	
Meningitis, epidemic	107	28	216	53
Paratyphoid fever	116	4	332	8
Pneumonia	15,818		30,072	
Scarlet fever	316	7	837	17
Smallpox	3		4	
Syphilis	16,639		32,303	
Tuberculosis	32,215		62,512	
Typhoid fever	373	42	906	91
Typhus fever	25	1	58	1
Whooping cough	6,160		11,608	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Burma—Bassein.—During the week ended March 12, 1949, 1 case of cholera was reported in Bassein, Burma.

India—Calcutta.—Cholera has been reported in Calcutta, India, as follows: Week ended March 12, 1949, 137 cases, 33 deaths; week ended March 19, 136 cases, 43 deaths; week ended March 26, 234 cases.

Indochina (French)—Cochinchina.—On March 20, 1949, 1 fatal case of cholera was reported in Cochinchina, French Indochina.

Plague

British East Africa—Tanganyika.—During the period February 1–20, 1949, 11 cases of plague, with 9 deaths, were reported in Tanganyika, British East Africa.

China—Wenchow.—During the period March 5–9, 1949, 3 cases of plague were reported in Wenchow, Chekiang Province, China.

India.—Plague has been reported in Calcutta and Cawnpore, India, as follows: In Calcutta, week ended March 19, 1949, 5 cases, week ended March 26, 18 cases; in Cawnpore, week ended March 12, 34 cases, 10 deaths, week ended March 19, 23 cases, 6 deaths, week ended March 26, 28 cases.

Rhodesia (Northern).—During the period February 1–17, 1949, 2 fatal cases of plague were reported in the Mankoya district of Barotseland Province, Northern Rhodesia.

Siam.—During the period February 20–March 12, 1949, 77 cases of plague, with 17 deaths were reported in Siam.

Smallpox

British East Africa—Nyasaland.—Smallpox has been reported in Nyasaland, British East Africa, as follows: In Lilongwe, week ended March 5, 1949, 19 cases, 4 deaths; in Blantyre, week ended March 12, 95 cases, 39 deaths (including cases not previously reported).

Burma.—For the week ended March 19, 1949, 12 cases of smallpox were reported in Rangoon, Burma, and 7 cases in Moulmein; for the week ended March 26, 17 cases were reported in Rangoon and 5 cases in Moulmein.

China.—Smallpox has been reported in China as follows: For the period March 1-10, 1949, Amoy 16 cases, Canton 28 cases; for the week ended March 26, Shanghai 19 cases.

Cuba—Habana.—Information received April 6, 1949, states that 1 additional case of smallpox has been reported in Habana, Cuba. This case is stated to have developed in the wife of the original patient. She had been in contact with him throughout the illness, and with all other contacts had been in isolation. The observation of these contacts ended April 6; and if no further cases developed before the end of the day, the quarantine of the contacts was to be ended as of that date.

India.—Smallpox has been reported in cities in India as follows: Week ended March 19, 1949, Ahmedabad 65 cases, Bombay 87 cases, Calcutta 62 cases, Madras 32 cases; week ended March 26, Bombay 118 cases, Calcutta 46 cases, Madras 28 cases.

Java—Batavia.—Information dated March 10, 1949, states that in the recent epidemic of smallpox in Batavia, 1,000 cases had been reported in Batavia and vicinity, up to March 3. The seriousness of the outbreak is stated to be considered increasing.

Transjordan.—During the week ended March 26, 1949, 15 cases of smallpox were reported in Transjordan, including 7 cases in Amman.

Typhus Fever

Chile—Santiago.—During the period March 4-20, 1949, 20 cases of typhus fever were reported in Santiago, Chile.

Ecuador.—During the period February 1-28, 1949, 28 cases of typhus fever (including murine type) were reported in Ecuador.

Italy—Naples.—During the week ended February 19, 1949, 5 cases of typhus fever with 2 deaths were reported in Naples, Italy.

Portugal—Lisbon.—During the week ended March 19, 1949, 1 case of typhus fever was reported in the city of Lisbon, Portugal.

Yellow Fever

Belgian Congo—Stanleyville Province.—On March 6, 1949, 1 death from yellow fever was reported in Titule Region, Stanleyville Province, Belgian Congo.

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The Public Health Reports is printed with the approval of the Bureau of the Budget as required by Rule 42 of the Joint Committee on Printing.

The Public Health Reports, first published in 1878 under authority of an act of Congress of April 29 of that year, is issued weekly by the Public Health Service through the Division of Public Health Methods, pursuant to the following authority of law: United States Code, title 42, sections 241, 245, 247; title 44, section 220.

It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The Public Health Reports is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the Public Health Reports, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

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Public Health Reports

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Time Analysis of Public Health Nursing Service

Alameda County Health Department, 1946–1947

By James C. Malcolm, M. D., M. P. H., James W. Moreland, M. D., M. P. H., Ramona Hopkins and Mildred A. Snyder*

Recent administrative changes and an increased budget for the Alameda County Health Department, California, led to the planning of new phases of the public health program. Since modifications in nursing services were planned and under way, it seemed advisable to measure the present scope of services in order that future increases in staff and the development of existing and additional nursing service could be conducted on a sound basis.

Alameda County Health Department serves the unincorporated area of Alameda County, and by contract, the cities of Hayward, Pleasanton, and San Leandro. A recent population estimate indicates that there are approximately 120,000 people to be served, in an area of 677.5 square miles. The population increased about 80 percent during the period 1940 to 1947. The problems of the area are both urban and rural, since the unincorporated territory surrounding the cities of San Leandro and Hayward has become predominantly urban because of the rapid population increase during and following the war. The southern and eastern parts of the county have remained a farming area, with several small trading centers.

The department evolved from the local health Centers, supported by the Red Cross and county funds, and out-patient clinics of the county hospitals, and was first organized in 1932. School nursing service has always been a part of the generalized program; bedside nursing has never been included. During the 1946–47 school year, 42 schools, with a total enrollment of about 8,400 students, were given health service by contract.

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*Health officers, director, public health nursing and public health statistician, respectively. This study [illegible] of the data made under two health officers, Dr. Moreland, health officer from [illegible] 1947, and Dr. Malcolm, present health officer of Alameda County, [illegible]

The present professional staff includes a health officer, a director of public health nursing, 12 public health staff nurses, 5 sanitarians, 1 rodent control officer, and 1 public health statistician. Three public health nurses work from a district office located in the southern end of the county. The director supervises the activities of all the nurses and, in addition, attends to the administrative details of the nursing program.

For a number of years each nurse has written a monthly narrative report of her activities. It was found that these narratives were not uniform in content and could not be used to evaluate the nursing program. The California State Department of Public Health Quarterly Statistical Report of Activities, which had also been kept for a number of years, proved to be of very limited value since an appreciable proportion of the nursing activities were not recorded on this report. For example, time spent by nurses in the office on records or program planning and field activities that could not be classified as "admissions" or "visits" was not itemized. In addition, this report gave only the number of visits in the various services. There was a need to know the amount of time devoted to each of the major fields of nursing service.

Other nursing records that are routinely kept were examined to see if they could provide the necessary data for the analysis. It was found that none would lend themselves to the type of tabulation and analysis that was needed. Therefore, a time analysis of public health nursing activities was devised.

It was realized that the validity of a study of this type would depend upon the close cooperation of the nursing staff. Therefore, tentative plans were formulated and presented to the nurses at a staff meeting. Their suggestions and criticisms were accepted and the procedure revised accordingly. Two of the staff nurses tried out the plan for 2 days and further revision of the procedure was discussed and adopted at a second staff meeting. Printed instructions were prepared and given to each nurse. These instructions briefly listed the plan of recording time decided upon by the nurses at their staff meeting.

Since each nurse kept a daily log of her activities in order to furnish the data for the quarterly statistical report previously mentioned, it was decided to modify the daily log recording to include all the various activities of the nurses and provide for recording time (see sample daily log). Time was recorded to the nearest 5 minutes in the "remarks" column of the daily log. Time spent in travel was charged to the service which the nurse intended to perform. All "not at home" visits were listed and charged to the intended service. Each nurse was encouraged to explain any service or activity that apparently was not included in the established categories. In all cases, these were allocated to the category which fit best. Each nurse was requested to submit her daily log at the end of each working day. Tallying and classifying of items was done as soon as possible in order that detectable errors and ambiguities in recording could be clarified with the nurse. The actual number of minutes that each nurse should have worked during each day was compared with her total recorded time for that day. Discrepancies of more than 30 minutes in any working day were queried.

DAILY REPORT

Name of Worker: Nurse 1 County: Alameda Date:

CODE	NAME	ADDRESS	REMARKS	TIME
E 16	Kiddies Play Center	61 Jones St., Hayward		60
	Fixit Garage	Foothill Blvd	Flat tire	25
D 5	Mrs. Susie Smith	3869 Beach Ave., Hayward	Prenatal	45
F 5	Jimmy Smith	do	Ringworm	5
B 4a	Walt Brown	Slumber Inn, Hayward	G. C. infection	15
D 5	Mrs. Ralph Gardener	920 Main St., Hayward	Prenatal	30
C 7	Ann Gardener	do	Tbc	10
C 7	Zany Fletcher	74391 Hanson Rd., Hayward	Tbc	25
	Jack Angill	74397 Hanson Rd., Hayward	School—not at home	10
C 7	Trixie Hope	641 Oak Ave., Hayward	Tbc contact	25
F 5	Lee Lyon	791 Oak Ave., Hayward	Hearing loss	30
E 5 (2)	Joan and Jimmie Iscotch	743 Maple Ave., Hayward	Newborn	15
D 11	Hattie Iscotch	do	Postpartum	35
	Driving to San Leandro office			20
	Daily log—time report			25
	Service records:			
	Tbc—30			
	MCH—20			
	V. D.—5			
	School—30			75
	Total			465

In order to keep the amount of clerical and nursing time required for this study at a minimum, it was decided to use four 2-week sample periods rather than a continuous time record throughout the year. The sample periods were selected to be representative of the seasonal variations in nursing activities in this department. The dates chosen were October 23 to November 2, 1946; January 13 to January 25, 1947; April 28 to May 10, 1947, and June 30 to July 12, 1947.

The service code used in the State Quarterly Statistical Report and on the daily logs indicates the major fields of nursing service—tuberculosis, school services, etc. This code was enlarged and in some cases re-defined to permit recording of all nursing activities. The following categories of service were used in the study.

FIELD SERVICE CATEGORIES

1. *Communicable Disease Services:* Includes all home visits and other field activities pertaining to the cases of communicable disease with the exception of tuberculosis and venereal disease.

2. *Venereal Disease Service:* All home visits and other field activities pertaining to venereal disease cases or contacts.
3. *Tuberculosis Service:* All home visits and other field activities for tuberculosis cases or contacts.
4. *Maternal, Infant, and Preschool Health Services:* All home visits and other health supervision activities pertaining to prenatal and postpartum cases, and to children from birth through 5 years of age (except persons with tuberculosis, venereal disease, other communicable disease, crippling defects or other morbidity).
5. *Adult Hygiene Service:* Includes all home visits and other field activities for the purpose of health supervision of well adults. Does not include service to persons with tuberculosis, venereal disease, other communicable disease, other illnesses, and crippling defects in adults under 21 years of age.
6. *Morbidity Service:* Includes all home visits and other field activities in behalf of persons who are ill for reasons other than tuberculosis, venereal disease, other communicable disease or crippling defects.
7. *Crippled Children Service:* All home visits and other field activities in behalf of handicapped children from birth to 21 years of age. This includes rheumatic fever.
8. *School Service:* Because school service includes such a variety of nursing activities, it was decided to analyze this program in more detail.

   a. *Driving to School:* Includes the time required to drive from the office, or last field visit, to the school building.

   b. *Office Nursing:* Includes the following: (1) Complete inspections given the children for the purposes of evaluating their general health; (2) Vision testing of children referred by teachers for special sight analysis; (3) Services in the school building to children referred by teacher because of a suspected health problem; (4) Planning, preparing for and assisting in immunization clinics held in the school; (5) Any service pertaining to the school lunch program, for example, interviews with cafeteria managers, nutritionists, or other general supervision of cafeterias.

   c. *School Conferences:* Includes the time spent interviewing teachers on matters relating to the school health program or individual health problems. Interviews with other school personnel or P. T. A. members. Time spent in planning the program; work on committees; or attendance at local meetings.

   d. *School Records:* Time spent on school records or other general clerical tasks in the school.

   e. *Home Visits, Child Ill:* All home visits to school children who are ill, or visits for defect follow-up or other health supervision problems.

   f. *Home Visits, Child Not Ill, or Not at Home:* Home calls to children who were absent for other reasons than health. Includes all unproductive visits where the child is not at home, the family has moved, the family is on vacation, or an incorrect address was given.

NURSING OFFICE CATEGORIES

1. *Driving to Office:* Driving time from the last visit or school to the nursing office.
2. *Records and Reports of an Administrative Nature:* Time spent in working on records or reports not directly related to any of the other services, e. g., monthly narrative report, daily log, time study, program planning, and miscellaneous clerical work.
3. *Records, and Office Visits Pertaining to Cases:* The general clerical work and office conference visits pertaining to a specific service, such as tuberculosis, venereal disease, communicable disease, etc.

4. *Meetings and Conferences:* Conferences with the health officer, supervising nurse, and other staff nurses, staff meetings, institutes, and other public health nursing meetings.
5. *Clinics:* All work related to any clinic or preparation and clean-up for any clinic held by the health department.
6. *Professional Reading:* Includes all professional reading done during time on duty.

Analysis of Data

The basic data collected on the nurses' daily logs during the four sample periods were tallied in two ways (1) by time spent in each field of service and (2) by time spent in home visits. The former tabulation was made to show the relative emphasis placed on the various services; the latter to provide more detailed information concerning home nursing visits.

Analysis by Services

It was found that approximately 60 percent of all nursing time during the four sample periods was spent in the field, and about 40 percent in the nursing office (table 1). Seasonal differences are indicated by the percentage variation among the four sample periods.

Table 1. *Time in minutes of work performed by nursing staff during four 2-week sample periods*

Number of minutes	All samples		First sample		Second sample		Third sample		Fourth sample	
	Minutes	Percent	Minutes	Percent	Minutes	Percent	Minutes	Percent	Minutes	Percent
To be worked	186,225	--	50,550	----	40,875	---	56,915	---	37,945	---
Total worked	184,745	100.0	50,090	100.0	40,780	100.0	56,130	100.0	37,745	100.0
Spent in nursing office	77,265	41.8	17,565	35.1	12,170	29.9	23,505	41.9	24,025	63.7
Spent in field service	107,480	58.2	32,525	64.9	28,610	70.1	32,625	58.1	13,720	36.3

Table 2. *Time spent in field services and office by each nurse during four 2-week sample periods*

Nurse	Minutes worked	Percent	Field service		Office	
			Minutes	Percent	Minutes	Percent
All nurses	184,745	100.0	107,480	58.2	77,265	41.8
Nurse 1	17,655	100.0	10,320	58.5	7,335	41.5
Nurse 2	13,620	100.0	7,555	55.5	6,065	44.5
Nurse 3	9,370	100.0	6,580	70.2	2,790	29.8
Nurse 4	15,855	100.0	8,870	55.9	6,985	44.1
Nurse 5	18,925	100.0	9,905	52.3	9,020	47.7
Nurse 6	13,295	100.0	9,630	72.4	3,665	27.6
Nurse 7	18,620	100.0	10,430	56.0	8,190	44.0
Nurse 8	11,995	100.0	6,220	51.9	5,775	48.1
Nurse 9	16,920	100.0	9,205	54.4	7,715	45.6
Nurse 10	18,160	100.0	12,175	67.0	5,985	33.0
Nurse 11	15,270	100.0	8,815	57.7	6,455	42.3
All others	15,060	100.0	7,775	51.6	7,285	48.4

During the fourth, or summer period, about 36 percent of nursing time was spent in the field, and about 64 percent in the nursing office.

The individual nurses did not vary widely in time given to field service (table 2). Two nurses averaged, during the four samples, more than 70 percent of their time in the field, while no one spent less than one-half of her time in the field.

Table 3. *Analysis of minutes of work spent in field services by the nursing staff during four 2-week sample periods*

Service	All samples		First sample		Second sample		Third sample		Fourth sample	
	Minutes	Percent	Minutes	Percent	Minutes	Percent	Minutes	Percent	Minutes	Percent
Total spent in field services	107,480	100.0	32,525	100.0	28,610	100.0	32,625	100.0	13,720	100.0
School	73,330	68.3	25,685	79.0	21,150	74.0	23,475	72.0	3,020	22.0
Tuberculosis	13,170	12.2	2,740	8.4	2,295	8.1	2,810	8.6	5,325	38.8
Venereal disease	1,080	1.0	440	1.4	70	------	315	.9	255	1.9
Other communicable disease	6,915	6.4	1,080	3.3	2,285	8.0	2,605	8.0	945	6.9
Maternal, infant, and preschool health	6,940	6.5	1,615	5.0	1,495	5.2	1,845	5.6	1,985	14.5
Adult hygiene	615	.6	130	.4	130	.5	185	.6	170	1.2
Morbidity	2,600	2.4	330	1.0	535	1.9	485	1.5	1,250	9.1
Crippled children	2,830	2.6	505	1.6	650	2.3	905	2.8	770	5.6

Analysis of time spent in field services reveals that approximately 68 percent of the field time is devoted to school health service, 12 percent to tuberculosis service, 6 percent to maternal, infant, and preschool health service, 7 percent to other communicable disease services, and 7 percent to all other services (table 3, fig. 1).

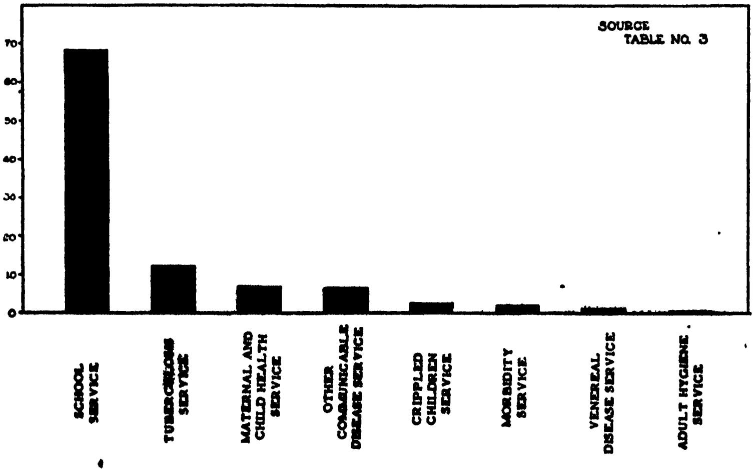

Figure 1. Percentage analysis of field service.

Variation among the nurses ranged from 85 to 52 percent of field time devoted to school health services, 6 to 22 percent for tuberculosis service, 1 to 16 percent for maternal, infant, and preschool health service, and less than 1 to 13 percent for other communicable disease services (table 4).

The demands of the school health program are clearly reflected by the variations in percentages during the four sample periods (table 3). During the summer sample, for example, only 22 percent of the field time was devoted to school health service, while 39 percent was spent in tuberculosis service, and 14 percent in maternal, infant and preschool health service. The apparent rise in percentage spent in morbidity service during the summer is probably due to erroneous recording of school visits during the summer months. It should be pointed out here that at the time this study was made, the department had a limited venereal disease program and no clinic, and a limited maternal and child health program, and no child health conferences. Therefore, the small portion of time devoted to those services was not surprising.

Table 4. *Percentage analysis of minutes worked by each nurse by type of field services during four 2-week sample periods*

Nurse	Minutes in field services	Percent	School	Tuberculosis	Venereal disease	Other communicable disease	Maternal, infant, preschool health	Adult hygiene	Morbidity	Crippled children
All nurses	107,480	100.0	68.2	12.2	1.0	6.5	6.5	0.6	2.4	2.6
Nurse 1	10,320	100.0	71.9	6.7	(*)	5.8	7.9	(*)	2.0	5.7
Nurse 2	7,555	100.0	61.7	14.8	(*)	13.2	3.2	1.6	2.5	3.5
Nurse 3	6,580	100.0	68.1	13.1	(*)	8.7	3.8	2.3	4.0	(*)
Nurse 4	8,870	100.0	52.5	12.4	1.8	10.9	16.4	(*)	3.5	3.0
Nurse 5	9,905	100.0	61.0	22.0	2.8	5.0	1.4	(*)	2.6	5.2
Nurse 6	9,630	100.0	85.5	6.1	(*)	4.7	2.4	(*)	1.8	(*)
Nurse 7	10,430	100.0	76.3	5.8	1.3	5.1	8.3	(*)	2.0	1.2
Nurse 8	6,220	100.0	65.5	18.2	(*)	3.8	6.8	(*)	6.2	(*)
Nurse 9	9,205	100.0	74.2	12.4	1.4	(*)	3.8	1.9	1.3	5.0
Nurse 10	12,175	100.0	65.5	9.5	(*)	10.5	9.2	(*)	3.3	2.0
Nurse 11	8,815	100.0	70.8	14.4	1.5	3.3	10.0	(*)	(*)	(*)
All others	7,775	100.0	71.2	17.5	(*)	5.6	2.7	(*)	1.6	1.4

*Percentages were not computed for individual nurses when the total time spent in any service was less than 100 minutes.

During the four sample periods, approximately 40 percent of the nurses' time was devoted to nursing office activities (table 1). The unusually great amount of time spent in the office during the summer was primarily due to two factors: (1) vacations releasing a high percentage of nursing time, and (2) a lack of organized programs in the other services such as infant and preschool hygiene, venereal disease and tuberculosis.

The tabulated data collected for a more detailed analysis of nursing office activities (table 5) probably do not indicate how office time was actually spent. However, we feel that the total time spent in the

Table 5. *Analysis of minutes spent in the office by the nursing staff during four 2-week sample periods*

Office service	All periods		First sample		Second sample		Third sample		Fourth sample	
	Minutes	Percent	Minutes	Percent	Minutes	Percent	Minutes	Percent	Minutes	Percent
Spent in office	77,265	100.0	17,565	100.0	12,170	100.0	23,505	100.0	24,025	100.0
Travel to office	8,665	11.2	2,090	11.9	1,795	14.7	3,435	14.6	1,345	5.6
Administrative records and reports	23,255	30.1	5,765	32.8	4,325	35.6	5,760	24 5	7,405	30.9
Service records	15,575	20.2	3,730	21.2	1,830	15.0	4,510	19.2	5,505	22.9
Meetings and conferences during office hours	21,615	28.0	2,675	15.2	2,320	19.1	8,320	35.4	8,300	34.5
Clinics and clinic preparation	3,245	4.1	995	5.7	1,170	9.6	455	1.9	625	2.6
Professional reading	4,910	6 4	2,310	13.2	730	6.0	1,025	4.4	845	3.5

office and the travel time to the office are valid figures. It was noted, while tallying time from the daily logs that some nurses did not properly record time spent on service records or in conferences. There was a tendency to lump all office time under "records and reports of an administrative nature."

Since it was known before this time study was undertaken that a large proportion of the nursing activities (during the school year) was devoted to school health programs, a special tabulation was made for this service (table 6). About one-third of the nursing time spent in school health service was devoted to office nursing, about one-fourth to home visits, about one-sixth to conferences with school personnel, and one-eighth to school record work.

Table 6. *Analysis of minutes of work spent in school field service by nursing staff during four 2-week sample periods*

School service	All periods		First sample		Second sample		Third sample		Fourth sample	
	Minutes	Percent	Minutes	Percent	Minutes	Percent	Minutes	Percent	Minutes	Percent
Spent in school service	73,330	100.0	25,685	100.0	21,150	100.0	23,475	100.0	3,020	100.0
Travel to school	6,056	8.3	2,355	9.2	1,660	7.8	1,930	8.2	110	3.6
Office nursing	26,575	36.2	11,180	43.5	6,890	32.6	8,505	36.2	--------	------
School conferences	12,410	16 9	3,870	15.1	4,190	19.8	4,350	18.5	--------	------
School records	9,020	12.3	3,025	14.1	2,265	10.6	2,265	9 7	890	29.5
Total field visits	19,270	26.3	4,655	18.1	6,170	29 2	6,425	27.4	2,020	66.9
Child ill	16,815	22.9	3,830	14.9	5,410	25.6	5,623	24.0	1,950	64.6
Child not ill or not at home	2,455	3.4	825	3.2	760	3.6	800	3.4	70	2 3

Individual nurses varied widely in time devoted to the various school activities (table 7). Among the individual nurses percentage of time devoted to office nursing varied from 60 to 22 percent; school conferences from 6 to 43 percent; field visits from 15 to 44 percent; school record work from 5 to 20 percent. This variation may be partially explained by the varied philosophies of school superintend-

Table 7. *Percentage analysis of minutes spent in school service by each nurse during four 2-week sample periods*

Nurse	Total minutes in school	Percentages							
		Total per cent	Travel to	Office nursing	School conferences	School records	Field visits		
							Total	Child ill	Not ill
All nurses	73,330	100.0	8.3	36.2	16.9	12.3	26.3	22.9	3.4
Nurse 1	7,255	100.0	7.4	29.7	9.8	20.2	32.9	30.2	2.7
Nurse 2	4,665	100.0	8.9	43.7	15.5	5.0	26.9	24.4	2.5
Nurse 3	4,445	100.0	3.6	31.3	7.9	12.7	44.5	44.5	-
Nurse 4	4,655	100.0	12.1	31.4	13.6	12.8	30.1	24.2	5.9
Nurse 5	6,045	100.0	11.5	21.8	43.3	7.4	16.0	15.0	1.0
Nurse 6	8,195	100.0	5.2	43.2	10.4	12.8	28.4	25.8	2.6
Nurse 7	7,905	100.0	7.6	20.0	39.0	10.4	23.0	18.1	4.9
Nurse 8	3,915	100.0	11.2	41.0	11.8	19.5	16.5	12.6	3.9
Nurse 9	6,755	100.0	7.6	38.7	18.0	16.1	19.6	17.3	2.3
Nurse 10	7,945	100.0	4.7	50.7	6.1	9.8	28.7	26.8	1.9
Nurse 11	6,145	100.0	17.4	25.7	12.0	11.5	33.4	23.8	9.6
All others	5,405	100.0	5.0	60.3	9.4	9.9	15.4	12.6	2.8

ents relative to work of the nurse in the school. These differences in philosophy and other factors have resulted in somewhat varied school programs. The other factors that must be considered when comparing these differences in emphasis are the background, experience and personality of the nurse serving the school.

Analysis by Home Visit

This section is devoted to the analysis of home visits made during the four sampling periods. Approximately one-quarter of the total time of the nursing staff was spent making home visits (table 8). Percentages among the individual nurses varied from 17 to 43 percent. Home visits averaged 26 minutes in length for all nurses. Averages for individual nurses ranged from 22 to 40 minutes. It must be remembered here that the time required to travel to the home was charged as time spent in the home. Since time was recorded to the

Table 8. *Analysis of total time spent in homes by each nurse during four 2-week sample periods*

Nurse	Number sample periods	Total minutes worked	Minutes spent in homes	Percent total time	Number home visits	Average number minutes per visit
All nurses	4	184,745	44,480	24.1	1,694	26.2
1	4	17,655	4,995	28.3	190	26.3
2	3	13,620	3,655	26.8	107	34.2
3	2	9,370	4,045	43.2	100	40.4
4	4	15,855	4,625	29.2	178	26.0
5	4	18,925	4,110	21.7	119	34.5
6	3	13,295	3,560	26.8	135	26.4
7	4	18,620	3,510	18.8	132	26.6
8	3	11,995	2,025	16.9	59	34.3
9	4	16,920	2,960	17.5	106	27.9
10	4	18,160	4,795	26.4	202	23.7
11	4	15,270	3,460	22.6	156	22.2
All others	3	29,430	2,740	9.3	117	23.4

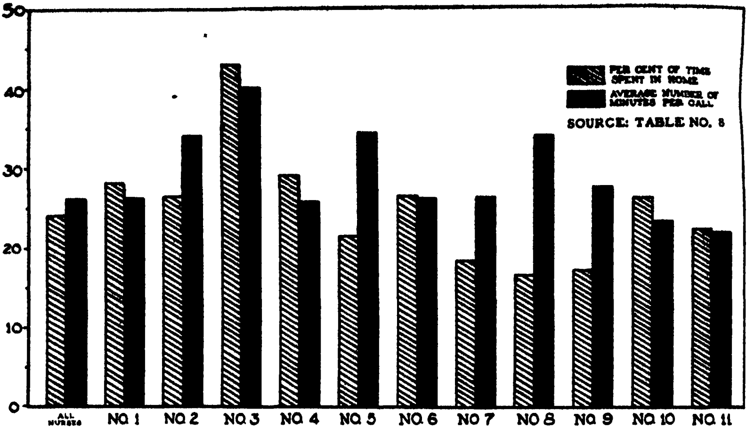

Figure 2. Percent of time spent in home calls and average number of minutes per call for each nurse.

nearest 5 minutes, only a rough estimate can be made of the average travel time per home call. In districts with concentrated population, travel time is negligible, in other districts travel time might average 15 to 20 minutes per call. Analysis of "not at home" calls (table 9) would indicate that travel time for all visits would probably average at least 10 minutes per home visit.

Table 9. *Analysis of not at home visits made by the nursing staff during four 2-week sample periods*

	Total visits	Total minutes	Average number minutes per visit	Number of minutes per visit							
				5	10	15	20	25	30	35	40
Total not at home visits	310	4,075	13.1	48	126	74	38	13	9	1	1
School not at home visits	109	1,390	12.8	15	49	23	11	6	2	----	----
Other not at home visits	201	2,685	13.4	33	77	51	27	7	7	1	1

According to the instructions given for coding activities in the State Quarterly Statistical Report, when more than one type of service is given in a home, each service is credited with a "home call." Because of this system of recording, a tally was made of the time spent in each type of service given in the home (table 10). The nurses had been instructed, when they recorded more than one type of service per home call, to estimate the time spent in each service, rather than the total time spent in the home. Morbidity service took the highest number of minutes per call. Calls of this type are generally emergencies. It has been the practice for many years for the public health nurse to make preliminary home calls to the indigent ill requesting the services of a county doctor. Most of the morbidity calls recorded during the four sample periods were for this purpose. Home calls to render tuberculosis service were longer than for any other service, except morbidity; an average of 33 minutes was spent per home call in this service. School service calls averaged 23 minutes.

The median time recorded both for total time in the home, and for service calls in the home was 20 minutes (table 10). Errors in the recording of time are apparent. Some of the nurses tended to record home calls to the nearest 10 minutes, instead of to the nearest 5 minutes, consequently the mean or average is probably more accurate than the median figure.

Table 10. *Analysis of minutes spent in home visits by type of service given by nursing staff during four 2-week sample periods*

	Total in home	Services in home								
		Total	Tuberculosis	Venereal disease	Maternal, child health	School	Adult health	Morbidity	Crippled children	Communicable disease
Number minutes	44,480	44,480	10,330	575	5,885	16,835	560	2,185	2,485	5,625
Number visits	1,601	1,694	314	22	219	747	25	66	85	216
Average number minutes per visit	27.8	26.2	32.9	(*)	26.9	22.5	(*)	33.1	33.1	26.0
Length of visit:										
5	19	25	5	--------	7	7	3	--------	--------	3
10	139	177	13	4	27	111	4	3	3	12
15	196	233	21	2	23	129	6	8	12	32
20	344	382	48	6	44	209	2	8	13	52
25	198	204	35	1	24	88	2	7	11	36
30	289	294	66	4	40	113	2	15	17	37
35	89	87	22	1	12	26	2	3	10	11
40	118	109	40	1	14	25	1	8	10	10
45	61	59	12	1	7	16	1	5	4	13
50	48	39	15	1	9	8	1	1	1	3
55	17	17	9	--------	3	--------	--------	1	--------	4
60	39	35	11	--------	5	11	1	3	3	1
65	14	11	7	--------	2	1	--------	1	--------	--------
70	13	11	6	1	--------	1	--------	1	1	1
75	5	1	1	--------	--------	--------	--------	--------	--------	--------
80	4	3	--------	--------	1	2	--------	--------	--------	--------
85 plus	8	7	3	--------	1	--------	--------	2	--------	--------

*Averages were not computed where total number of visits was less than 50.

The average number of minutes spent in tuberculosis home visits ranged from 41 to 37 minutes among th nurses (table 11). The range for maternal, infant, and preschool health visits was 22 to 35 minutes.

For the purposes of illustration of one valuable feature of this study, a summary of the data recorded during the sample periods by two nurses is given.

Nurse 3 was employed by the department during the middle of the school year, and participated in the third and fourth sample periods, one during the school year, and one during the summer. She was assigned to a district of high economic level. She gave nursing service to a school with an enrollment of approximately 900 students. The population of her district is estimated roughly at 8,000 to 10,000. This nurse spent 70 percent of her time in field service, and 30 percent of her time in the nursing office. About 68 percent of her field time was devoted to school health service, 13 percent to tuberculosis service, 9 percent to other communicable disease service, and 10 percent was devoted to all other services. Analysis of her reported school activities reveals that she spent 45 percent of her school time in home calls, 31 percent in office nursing, 8 percent in school conferences, and 13 percent in school record work. She spent 43 percent of her total time making home visits. Her average number of minutes per call was 40.

Table 11. *Average time spent in services in the home for each nurse during four 2-week sample periods*

Nurse	Number of sample periods	Average number of minutes per service visit								
		All services	Tuberculosis service	Communicable disease	Venereal disease	Maternal, child health	School service	Adult health	Morbidity	Crippled children
All nurses	4	26.3	32.9	26.0	(*)	26.9	22.6	(*)	33.1	29.2
1	4	24.7	33.1	21.9	(**)	34.8	21.6	(**)	23.5	25.9
2	3	31 0	34.8	29.4	----	----	29.1	----	----	----
3	2	35.8	41.2	37.0	----	23.3	34.3	----	----	----
4	4	24.5	26 8	26.2	----	25.9	19.8	----	----	26.7
5	4	32.9	40.2	27.0	----	----	28.1	----	25.9	35.9
6	3	26 4	28.2	24.7	----	----	25.3	----	----	
7	4	25.1	30.6	28.3	----	30.3	21.2	----	----	----
8	3	29.8	33.4	----	----	----	23.1	----	28.5	----
9	4	25.3	34.5	----	----	26.7	19.2	----	----	----
10	4	23.4	31.6	21.8	----	26.7	19.7	----	----	----
11	4	22 0	29.3	22.8	----	21.9	19.4	----	----	----
All others	3	21.9	30.0	27.3	----	15.9	14.6	----	----	----

*Average number of minutes per service visit was not calculated where total number of visits was less than 50.

**Average number of minutes per service visit was not calculated for individual nurses where the total number of visits was less than 10.

Nurse 9 had a rural area of approximately 6,000 population. She gave nursing service to 4 elementary schools with a total enrollment of about 800 students. She spent about 54 percent of her total time in the field, and about 46 percent in the nursing office. Approximately 74 percent of her field time was devoted to school health service, 12 percent to tuberculosis service, 5 percent to crippled children services, and 9 percent to all other services. Analysis of her school health service time reveals that 39 percent was devoted to office nursing, 20 percent to field visits, 18 percent to school conferences, and 16 percent to school records. She spent only 18 percent of her total work time making home calls. Her home calls averaged 28 minutes in length.

A summary for each nurse similar to these two examples, when considered with other data, offers an aid in evaluating the work of the nurse in her district. Other factors that would have to be considered in such an analysis might be the following: (1) composition of the population along with economic and social data of the district; (2) mortality and natality rates in the district; (3) incidence of communicable disease, and other morbidity, and (4) nursing case load analysis. These data and the time analysis could then be weighted in relation to the subjective evaluation of a nurse's training, professional growth, and approach to the problem of her district.

Summary

A well-rounded public health program should include public health nursing services to all age groups, with particular emphasis in the fields of maternal and infant health, the health of the preschool and the school child. In addition, the groups with special need, such as those having tuberculosis, venereal disease, other communicable diseases, crippling defects, or mental health problems should receive assistance from the public health nurse. This time study offers statistical weight to the observation that at present the public health nursing program of this department is grossly weighted with school health service. The notable lack of organized programs for venereal disease control and for maternal, infant, and preschool health are definitely pointed out by this study. Immediate expansion of nursing service in fields other than school health is essential for a well-rounded program. The rapid population growth of the area indicates that the total time devoted to school health service cannot be decreased and will, undoubtedly, have to be increased to meet the larger enrollments and provide services to new schools being planned.

The time analysis of the school health program (table 7) reveals a wide variation in emphasis among the nurses. There is need for more planning and coordination between health department administrative personnel and school administrative personnel so that the public health nursing time spent in the schools may be used to the best advantage. Coordinated administrative action should help to reduce the use of public health nursing time for screening students, minor first aid, extensive record keeping, and verification of student illness. Reduction in the amount of nursing time devoted to these activities would permit a school health program that would concentrate on the health of the child, his family, and the community.

Another value of a study of this type is that it points the way for additional administrative evaluation and study of the various activities of the nursing staff. This analysis did not materially assist in evaluating office activities and record keeping practice. A method other than a time study should be used for this phase of the evaluation. A wide variation in the percentage of time devoted to making home visits and in the length of time spent in the home was found. Further evaluation of home visits will require more supervision for the nursing staff, and more administrative action.

We feel that a time analysis of professional services based on sampling periods makes unnecessary the routine collection of detailed quantitative data about nursing service which has heretofore been deemed necessary for the evaluation of a nursing program in a local health department. The data that we have collected enabled us to determine what the activities of the nursing staff are in terms of the amount of time devoted to each of the major fields of public health nursing. It has offered an opportunity to objectively determine whether professional time is utilized to fulfill the aims of nursing service in a well-rounded public health program.

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Isolation of *Brucella abortus* From Hogs

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It is a general belief that *Brucella abortus* is not pathogenic for swine. Huddleson states, "No one has reported the isolation of *Br. abortus* from naturally infected swine (*1*). Attempts to infect hogs experimentally with *Br. abortus* likewise have been virtually unsuccessful (*2*).

Br. suis is regarded as the etiological agent of the infection in swine, but it is known that these animals are also susceptible to *Br. melitensis*. In the United States, Borts, McNutt and Jordan (*3*) isolated *Br. melitensis* from 12 hogs in 1946. They believed this to be the first such instance in this country. Huddleson (*1*) classified only 2 strains as *Br. melitensis*. among 132 strains of Brucella isolated from hogs in the United States.

In view of the lack of similar species specific resistance to Brucella in other animals, this apparent resistance of swine to *Br. abortus* would appear anomalous. Accordingly, during the course of an investigation of the incidence of brucellosis in swine by use of cultural methods, we were led to adopt a procedure favorable to the recovery of *Br. abortus* should it be present.

The purpose of the present paper is to report the recovery of *Br. abortus* from naturally infected hogs.

Procedure

Submaxillary lymph nodes were obtained, in a program of routine weekly sampling, from hogs slaughtered in one of the large packing plants in Chicago. This program has now extended over a period of 6 months. Specimens were obtained from the carcass immediately after the initial Bureau of Animal Industry inspection of head glands. The nodes were removed with sterile instruments and placed in individual sterile screw-capped glass jars. These samples were then returned to the laboratory and promptly cultured. Each node was removed from its container, trimmed of fat, well seared in a flame, sectioned, and the cut surface directly streaked on the surface of Trypticase-Soy agar medium. Sterile instruments were used throughout and resterilized between use on individual specimens. The inoculated plates were incubated at 37° C. in an atmosphere of 10 percent added carbon dioxide.

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Results

Br. abortus has been recovered from the lymph nodes of eight hogs. Isolations were made during four different weeks well scattered over the period of sampling. In addition to *Br. abortus* and *Br. suis*, *Br. melitensis* has also been isolated repeatedly.

Plates streaked with nodes from which Brucella was not recovered have in most instances been practically sterile. Plates yielding Brucella have uniformly contained numerous colonies, or even confluent growth. This, together with the rigid technique employed, can leave no question but that the Brucella recovered were from the sampled hogs.

All eight strains of *Br. abortus* adhered to the differential characteristics of the species. Identification was established by carbon dioxide requirement, hydrogen sulfide production, growth on differential dye plates, and the use of specific absorbed typing sera. Each strain was inoculated into guinea pigs. In every instance characteristic infection resulted, with production of agglutinins and recovery of *Br. abortus* in culture at postmortem examination.

Comment

The demonstration of the occurrence of *Br. abortus* in swine is of considerable practical importance. Its bearing upon the brucellosis control program in domestic animals is self-evident. Likewise, it may clarify some points in the epidemiology of the disease in man.

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 9, 1949

A total of 32,909 cases of measles was reported, as compared with 31,905 last week and a 5-year (1944–48) median of 25,842. The 5 geographic areas reporting increases are as follows (last week's figures in parentheses): Middle Atlantic 8,290 (6,725), East North Central 3,803 (3,539), West North Central 2,091 (2,012), South Atlantic 4,995 (4,855), East South Central 1,896 (1,569). The 10 States reporting more than 600 cases and showing increases are as follows: Connecticut 1,570 (last week 979), New York 3,319 (2,825), New Jersey 1,822 (1,663), Pennsylvania 3,149 (2,237), Ohio 678 (576), Michigan 678 (611), Wisconsin 2,075 (1,951), North Carolina 1,243 (979), Kentucky, 686 (250), Alabama 699 (634). The total for the year to date is 315,965, as compared with a 5-year median of 225,048 reported for the same period last year. Twice in the past 13 years the peak of weekly incidence of measles was reported in the second week of April, four times in May, and once in the first week of June.

The incidence of influenza declined from a total of 3,068 cases last week to 2,658 for the current week. The corresponding 5-year median is 2,148. The total to date is 58,429 cases, the corresponding 5-year median is 177,855.

Of 41 cases of poliomyelitis reported for the week, 7 occurred in Florida, 5 in Texas, and 4 each in Mississippi and California. For the 3 weeks since March 19, the average week of seasonal low incidence, 135 cases have been reported, as compared with 78, the median for the corresponding 3-week periods of the past 5 years.

During the week 3 cases of "Q" fever were reported, in Idaho, 3 cases of smallpox, in Mississippi, and 2 cases of Rocky Mountain spotted fever, 1 each in Illinois and Tennessee, and 1 case of anthrax was reported, in New York.

Deaths recorded during the week in 93 large cities in the United States totaled 9,352, as compared with 9,650 last week, 9,568 and 10,050, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 9,607. The total to date is 135,995, as compared with 140,253 for the corresponding period last year. Infant deaths totaled 600 as compared with 645 last week and a 3-year median of 698. The cumulative figure is 9,118, as compared with 9,584 for the same period last year.

Telegraphic case reports from State health officers for week ended April 9, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1	...	1	361	...	5	...	...	9	...	...	...	5	...
New Hampshire	...	...	2	80	...	...	...	...	3	...	...	...	...	...
Vermont	...	...	...	237	1	...	...	...	4	...	...	...	2	...
Massachusetts	3	1	...	1,001	...	...	...	...	164	...	...	...	71	...
Rhode Island	...	...	...	262	...	8	...	...	[e] 3	...	...	...	8	...
Connecticut	11	...	6	1,570	...	61	...	...	49	...	...	...	1	...
MIDDLE ATLANTIC														
New York	4	4	(b)	3,319	8	313	1	...	[e] 293	...	...	2	150	14
New Jersey	2	...	4	1,822	5	91	...	...	174	...	...	9	54	5
Pennsylvania	8	...	(b)	3,149	6	...	2	...	247	...	...	...	94	1
EAST NORTH CENTRAL														
Ohio	7	...	5	678	6	91	...	...	342	...	...	...	73	21
Indiana	7	...	1	219	1	16	...	...	64	...	2	1	25	17
Illinois	...	...	5	153	5	105	1	1	129	...	1	...	28	...
Michigan [a]	...	...	6	678	4	51	...	...	345	(1)	...	...	19	...
Wisconsin	1	1	26	2,075	1	10	1	...	79	...	...	1	24	1
WEST NORTH CENTRAL														
Minnesota	9	...	...	221	4	9	3	...	33	...	...	1	2	...
Iowa	...	...	...	73	...	1	3	...	28	...	...	...	1	7
Missouri	4	...	4	296	3	...	1	...	23	...	...	1	2	...
North Dakota	1	...	14	43	...	...	...	...	5	...	...	...	8	...
South Dakota	...	...	...	28	...	11	...	...	2	...	...	...	...	...
Nebraska	...	...	13	180	...	...	...	...	12	...	...	...	...	...
Kansas	2	...	...	1,248	...	20	...	...	23	(1)	...	...	10	...
SOTUH ATLANTIC														
Delaware	...	...	...	55	...	...	...	...	18	...	...	...	1	...
Maryland [a]	3	...	1	751	2	29	...	...	48	...	...	...	10	...
District of Columbia	2	...	...	130	...	26	...	...	13	...	...	...	3	...
Virginia	3	...	249	1,163	...	116	1	...	20	...	...	...	19	4
West Virginia	2	...	15	174	1	2	2	...	15	...	...	...	20	...
North Carolina	1	...	...	1,243	1	...	...	...	15	...	...	...	31	...
South Carolina	4	...	471	578	2	193	3	...	1	...	1	3	16	8
Georgia	3	1	27	575	...	27	...	...	12	...	3	1	1	8
Florida	2	...	4	326	2	30	7	...	10	...	3	4	4	1

EAST SOUTH CENTRAL														
Kentucky	2	1		686	5	18			30				9	6
Tennessee	2		92	407	4	88		1	16				14	
Alabama	2		170	699	1	38	1		13			1	5	9
Mississippi [a]	2		47	104	1	22	4		2	8	1		1	
WEST SOUTH CENTRAL														
Arkansas	2		127	966	2	53			1		1	2	9	2
Louisiana	2		6	99	4	29			2			3	2	
Oklahoma	1		47	445	2	53			8			3	7	4
Texas	20		1,120	2,799	7	357	5		34		4	2	90	33
MOUNTAIN														
Montana			16	50	1		1		12		2			
Idaho			11	114		12	1		[c] 11			1		
Wyoming				38	1	8			1					
Colorado	1		18	307	1	21			8				6	
New Mexico			1	159		15			8				2	
Arizona	2		99	170		18			11				2	
Utah [a]	1		1	105		2			6				28	
Nevada				1										
PACIFIC														
Washington	2		17	475	1	2			32				17	
Oregon			3	428		25			15				87	
California	7	1	29	2,167	5	31	4		[c] 103			3	21	8
Total	126	9	2,658	32,909	87	2,007	41	2	2,496	3	18	38	936	
Median, 1944-48	214	6	2,148	25,842	158		28		3,951	12	10	61	2,019	
Year to date 14 weeks	2,368	109	58,429	315,965	1,197	33,874	1,057	15	39,752	[1] 26	374	588	14,196	
Median, 1944-48	4,001	112	177,855	225,048	2,706		485	6	48,492	137	256	634	30,757	
Seasonal low weeks ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 20		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 20	(39th) Oct. 2	
Since seasonal low week	7,482		94,699	368,358	2,041		135		62,450	[1] 41		128	24,229	
Median, 1943-48	11,567		275,576	259,994	4,210		78		87,063	213		158	56,123	

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[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever, reported separately, as follows: New Jersey 9; South Carolina 1; Florida 1; Alabama 1; California 2; salmonella infections, not included, were reported as follows: Massachusetts 1.

[1] Deductions: Week ended March 19, 2 cases reported as smallpox, Michigan and Kansas, 1 each. Change of diagnosis.

"Q" Fever: Idaho, 3 cases.

Alaska: Influenza 1; measles 1; streptococcal sore throat 2.

Territory of Hawaii: Influenza 3; measles 211; lobar pneumonia 1; poliomyelitis 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 19, 1949.—During the week ended March 19, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		35	1	170	687	37	50	106	243	1,329
Diphtheria			1	16	1	1				19
Dysentery:										
Amebic								1		1
Bacillary				1						1
German measles				282	61	1	229	16	3	572
Influenza		111			18	8	7			144
Measles		115	44	99	466	227	180	289	217	1,637
Meningitis, meningococcal				1	1	2		2		6
Mumps		32	3	118	348	60	35	28	80	704
Poliomyelitis						1	2			3
Scarlet fever		2		116	114		3	17	24	276
Tuberculosis (all forms)		10	15	84	30	12	3	17	51	231
Typhoid and paratyphoid fever				3		1				4
Undulant fever				1	2	2		1		6
Venereal diseases:										
Gonorrhea		4	5	68	54	17	24	20	72	264
Syphilis		6	7	59	33	16	8	9	27	165
Whooping cough		20		90	7	7	6			130

GOLD COAST

Cerebrospinal meningitis.—Information dated April 4, 1949, states that 2,309 new cases of cerebrospinal meningitis with 142 deaths have been reported in the Northern Territories during the period March 10–26. The total to date in that area is stated to be 7,689 cases, 563 deaths. In Ashanti 15 new cases with 1 death had been reported.

NEW ZEALAND

Notifiable diseases—4 weeks ended February 26, 1949.—During the 4 weeks ended February 26, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	7		Poliomyelitis	90	1
Diphtheria	11		Puerperal fever	6	
Dysentery:			Scarlet fever	77	
Amebic	4		Tetanus	1	
Bacillary	6		Trachoma	2	
Erysipelas	12	1	Tuberculosis (all forms)	164	41
Food poisoning	43		Typhoid fever	5	1
Malaria	2		Undulant fever	1	

MADAGASCAR

Notifiable diseases—February 1949.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during February 1949 as follows:

Disease	February 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri-beri			9	0
Bilharziasis	3	0	112	0
Cerebrospinal meningitis			9	4
Dysentery:				
Amebic	12	0	232	5
Bacillary			4	0
Erysipelas			13	0
Influenza	26	0	1,734	24
Leprosy			37	0
Malaria	386	6	35,308	356
Measles	7	0	177	0
Mumps	4	0	122	0
Plague			16	15
Pneumonia, broncho			240	57
Pneumonia, pneumococcic			276	80
Poliomyelitis	1	0	1	0
Puerperal infection			12	2
Tuberculosis, pulmonary	6	1	111	18
Trachoma			1	0
Typhoid fever	6	1	23	9
Whooping cough	4	0	225	8

NICOBAR ISLANDS (INDIA)

Influenza.—An outbreak of influenzal broncho-pneumonia is reported to have occurred in Car Nicobar Island, Nicobar Islands, during the months of February and March, 1949. A total of 232 cases are stated to have been admitted to hospitals, and 10 deaths to have occurred. A report dated March 17, states that the epidemic is considered to be nearly over.

NORWAY

Notifiable diseases—December 1948.—During the month of December 1948, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	3	Mumps	670
Diphtheria	45	Pneumonia (all forms)	3,739
Erysipelas	412	Poliomyelitis	10
Gastroenteritis	2,203	Rheumatic fever	118
Gonorrhea	321	Scabies	2,579
Hepatitis, epidemic	116	Scarlet fever	584
Impetigo contagiosa	2,781	Syphilis	73
Influenza	13,307	Tuberculosis (all forms)	380
Laryngitis	14,088	Weil's disease	1
Malaria	2	Whooping cough	1,065
Measles	3,593		

REUNION ISLAND

Poliomyelitis.—During the period January 11–February 28, 1949, 92 cases of poliomyelitis with 15 deaths were reported in Reunion Island. The peak of incidence is stated to have occurred in the week ended February 19, when 26 cases were reported. Latest telegraphic information received up to March 10, indicated that the outbreak was nearing its end. For the period March 1–10, only 4 cases were reported.

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January—December 1948	January—February 1949	March 1949—week ended— 5	12	19	26
AFRICA						
Egypt	1					
Cario	1					
ASIA						
Burma	46	1				
Akyab	5					
Bassein	1			1		
Moulmein	1					
Rangoon	2					
China:						
Hupeh Province	3					
Wuchang	8					
Kaingsi Province	[1] 9					
Kiangsu Province	2					
Shanghai	1					
India	178,203	20,970	1,904	[3] 372	[3] 437	235
Ahmadabad	77					
Allahabad	[3] 6		1			
Alleppey	1					
Bombay	[3] 49	1				
Calcutta	[3] 7,985	1,180	104	137	186	234
Cawnpore	157				6	1
Cocanada	15					
Colachel	12					
Cuddalore	36	1	1			
Jodhpur	[3] 56					
Kilakarai	21					
Lucknow	48					
Madras	1,177	9				
Masulipatam	33					
Nagpur	74					
Negapatam	19	15	2	1		
New Delhi	26					
Raj Samand	6					
Tuticorin	16	18	1			
Vizagapatam	1					
India (French):						
Chandernagor	21					
Karikal	309	55				
Pondicherry	[4] 425	100				
Yanaon	2					
India (Portuguese)	29					

See footnotes at end of table.

CHOLERA—Continued

Place	January—December 1948	January—February 1949	March 1949—week ended— 5	12	19	26
ASIA—continued						
Indochina (French):						
Annam	[5] 49					
Cambodia	1,355	6			4	
Cochinchina	597				1	
Bien Hoa	1					
Chaudoc	2					
Cholon	29					
Giadinh	23					
Longxuyen	7					
Mytho	56					
Rachgia	133					
Saigon	136					
Laos	[6] 32					
Tonkin	20					
Pakistan	[4] 44,160	7,014	[7] 431	[7] 146	[7] 86	[7] 218
Chittagong	52	40		1	1	
Karachi	7					
Lahore	415	4				1
Siam	44					
Syria	3					

[1] Suspected [2] Preliminary figures [3] Includes imported cases [4] Corrected figure [5] Includes suspected cases, also 4 deaths reported as cases in December 1948 [6] Includes 12 deaths reported as cases in February 1948 [7] In Eastern Bengal Province only

PLAGUE

(Cases)

Place	January—December 1948	January—February 1949	March 1949—week ended— 5	12	19	26
AFRICA						
Basutoland		[1] 7				
Belgian Congo	23	2				1
Costermansville Province	[2] 12					
Stanleyville Province	11	2				1
British East Africa						
Kenya	39	1				
Tanganyika	319	[3] 11				
Ethiopia [4]						
Madagascar	240	39		[5] 5		
Tamatave	1					
Tananarive	33	1				
Rhodesia, Northern	21	2				
Union of South Africa	[6] 54	[7] 18				
ASIA						
Burma [8]	1,114	260				
Mandalay	18	1				
Rangoon	19	1	1			
China						
Chekiang Province	[9] 30			3		
Wenchow	14			3		
Fukien Province	350					
Foochow	4					
Kiangsi Province	[7] 66					
Kwangtung Province	116	(10)				
Yunnan Province	149					
India	25,678	9,071	2,490	[11] 474	[11] 352	[12] 28
Indochina (French)						
Annam	267	33	9	1	7	
Cambodia	6	9	1	5	1	1
Cochinchina	45	4	1	1		
Laos	5	3				
Mountain Area South-Indochina	23					
Java	3,107					
Pakistan	11					
Siam	135	87	21	14	10	
EUROPE						
Portugal: Azores	17	2				

See footnotes at end of table.

PLAGUE—Continued

Place	January—December 1948	January—February 1949	March 1949—week ended— 5	12	19	26
SOUTH AMERICA						
Argentina	12					
Buenos Aires Province	9					
Brazil	224					
Alagoas State	22					
Bahia State	158					
Ceara State	16					
Pernambuco State	28					
Ecuador	40					
Chimborazo Province	1					
Loja Province	39					
Peru	79					
Ancash Department	6					
Cajamarca Department	13					
Lambayeque Department	4	4				
Libertad Department	1					
Lima Department	40					
Piura Department	15					
Venezuela						
Aragua State	7					
OCEANIA						
Hawaii Territory Plague infected rats [13]	5					

Reported Jan 29 1949 in Mohale s Hoek District [2] Includes 1 case of pneumonic plague [3] Reported during the period Feb 5–19 1949 with 9 deaths [4] Correction Later information states that the 9 cases of plague reported in Shoa Province Ethiopia July 12 19 1948 (see Public Health Reports Jan 28, 1949 p 116) proved to be bronchopneumonia [5] Mar 1 10 1949 [6] Includes 4 cases of pneumonic plague [7] Includes suspected cases [8] Includes imported cases [9] Corrected figure [10] Correction Later information states that report of 6 cases of pneumonic plague in Canton Kwangtung Province China Feb 1 10 1949 (see Public Health Reports Mar 2 1949 p 396) was in error [11] Preliminary figures [12] In Cawnpore only [13] Plague infection was also reported in Hawaii Territory as follows Under date of Feb 27 1948 in a mass inoculation of tissue from 19 rats on Mar 12 1949 in a mass inoculation of tissue from 10 rats on Mar 16 1949 in a mass flea inoculation of 29 fleas from trapped rats

SMALLPOX

(Cases)

(P =present)

Place	January—December 1948	January—February 1949	March 1949—week ended— 5	12	19	26
AFRICA						
Algeria	397	64				
Angola [1]	605					
Basutoland	3					
Bechuanaland	2					
Belgian Congo [1]	3 144	379	41			
British East Africa						
Kenya	148	7				
Nyasaland	5 136	337	26	102	11	16
Tanganyika [1]	1 389	101				
Uganda	215	9				
Cameroon (French) [1]	6	8				
Dahomey	474	115		[3] 17		[3] 7
Egypt [4]	479	40	6	7		
Eritrea	9					
Ethiopia	25					
French Equatorial Africa	16					
French Guinea	136	1				
French West Africa Haute-Volta	441	10		[3] 18		
Gambia	27	1	1		1	
Gold Coast	1 559					
Ivory Coast	[5] 833	50		[3] 19		
Libya	279					
Mauritania	2					
Mauritius	[6] 1					
Morocco (French)	36	5		[3] 1		
Mozambique	380	42				
Nigeria	4 397					
Niger Territory	421	27		[3] 20		
Portuguese Guinea		1				
Rhodesia						
Northern	774	4				
Southern	1 763					
Senegal	8	6		[3] 7		
Sierra Leone	202	38			3	

See footnotes at end of table.

SMALLPOX—Continued

Place	January—December 1948	January—February 1949	March 1949—week ended— 5	12	19	26
AFRICA—continued						
Sudan (Anglo-Egyptian) [1]	1,464	23		1	3	
Sudan (French)	21	46		[2] 10		[3] 12
Swaziland	6					
Togo (British)	24					
Togo (French)	119	25		[2] 3		
Tunisia	544					
Union of South Africa	498	6	1	1	P	
ASIA						
Arabia	8	[7] 14	4	3	6	2
Bahrein Islands		[6] 32		2		2
British North Borneo	1					
Burma [4]	3,043	235	21	23	19	17
Ceylon [4]	22					
China [4]	4,134	389	12	[8] 62	5	26
India	[5] 60,619	10,558	2,086	1,271	1,447	236
India (French)	6	1				
India (Portuguese)	195	69				
Indochina (French)	4,097	1,517	148	176	108	6
Iran	1,195	117		1		
Iraq [4]	1,770	200	5	6	16	6
Israel		2				
Japan	[9] 20	4	3		8	
Java [4]	2	335	([10])			P
Korea		135				
Lebanon [4]	180	109	2			
Macao Island: **Macao**	11					
Malay States (Federated) [4]	546	34	6	2		
Manchuria	79					
Pakistan [4]	12,470	805	18	4	7	3
Palestine	8					
Philippine Islands: Mindoro Island	[11] 272	1				
Portuguese Timor			1			
Siam [4]	541	35	1		1	
Sumatra [4]	1,695	27			4	[6] 3
Straits Settlements: **Singapore**	13				[6] 1	
Syria	905	180	20		5	
Transjordan [4]	62	66	6	1	3	15
Turkey: **Izmir**	4					
(See also Turkey in Europe.)						
EUROPE						
France	3					
Germany	3					
Greece	8					
Italy [4]	11	2				
Portugal	80	2	1			
Spain	19					
Canary Islands	9					
Turkey	48	58	2	2	1	1
NORTH AMERICA						
British Honduras [1]	3					
Cuba: Habana					[6] 1	
Guatemala	2					
Mexico	985	3	1	1	1	
SOUTH AMERICA						
Argentina	54					
Bolivia	31					
Brazil [1]	755	50	1			
Chile	8					
Colombia	6,356	257	1			
Ecuador [1]	3,869	283	2	3	3	
Paraguay [1]	113					
Peru [1]	4,341	387				
Trinidad	[12] 12					
Venezuela [1]	5,141	233	30	7	76	

---

[1] Includes alastrim. [2] Mar. 1–10, 1949 [3] Mar. 11–20, 1949. [4] Includes imported cases. [5] Corrected figure. [6] Imported. [7] In the port of Makalla, Aden Protectorate. [8] Includes 49 cases reported Mar. 1–10, 1949. [9] Through week ended Dec. 25, 1948. [10] On Mar. 3, 1949, a press report in Batavia stated that an estimate of 1,000 cases of smallpox had been reported in Batavia and vicinity during the outbreak which began early in January. [11] Includes 1 case reported in Baguio City, Luzon Island. [12] Alastrim.

TYPHUS FEVER *

(Cases)

(P=Present)

Place	January—December 1948	January—February 1949	March 1949—week ended— 5	12	19	26
AFRICA						
Algeria	202	20				
Basutoland	10	2				
Belgian Congo [1]	251	16	3			
British East Africa:						
Kenya [1]	71					
Zanzibar	1					
Egypt	325	27	8		1	2
Eritrea	48	16	2	2		
Ethiopia	336					
French Equatorial Africa	1					
Gambia: Bathurst	1					
Gold Coast [1]	10					
Libya [1]	501	33	8	13	3	4
Madagascar: Tananarive [1]	7	2				
Morocco (French)	82	6		[3] 1		
Morocco (International Zone)	5					
Morocco (Spanish) [1]	8					
Mozambique [1]	3					
Nigeria [1]	7					
Rhodesia (Southern)	[3] 1					
Senegal	[3] 4					
Sierra Leone	[3] 18					
Somalia	2					
Tunisia [1]	627	5				
Union of South Africa [1]	430	8	2	2		
ASIA						
Burma	7					
Ceylon		2				
China [1]	194					
India	3	6				
India (Portuguese)	11	5				
Indochina (French) [1]	73					
Iran [1]	149	25				
Iraq [1]	222	6	6	1		
Japan	488	58	2		2	
Java	3					
Korea		23				
Lebanon		1				
Malay States (Federated)	3					
Manchuria	38					
Pakistan	22	6	31			
Palestine [1]	12	[4] 100				
Philippine Islands [1]	[5] 5	1				
Straits Settlements: Singapore [1]	[6] 20					
Syria [1]	66					
Transjordan	70	5			2	4
Turkey (see Turkey in Europe).						
EUROPE						
Albania	15					
Belgium				1		
Bulgaria	[7] 763	54				
Czechoslovakia	9	1	1			
France	5	1				
Germany:						
British Zone	8					
French Zone	12					
United States Zone	2					
Great Britain:						
Cyprus	[3] 1					
England and Wales	[3] 2					
London	[3] 2					
Ireland (Northern)	[3] 2					
Malta	[3] [7] 24	1				
Greece [1]	[8] 347	19			1	1
Hungary	61	5	6			
Italy [1]	138	14				
Sicily	27	9				
Netherlands	[3] 1					
Poland	405	45				
Portugal	8	1			1	
Azores: Ponta Delgada	3					
Madeira Islands: Funchal	1					

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January—December 1948	January—February 1949	March 1949—week ended— 5	12	19	26
EUROPE—continued						
Rumania [1]	22,211	220	12			
Spain	21	1				
Turkey	405	56	4	2	2	6
Yugoslavia [1]	633	56				
NORTH AMERICA						
Costa Rica [2]	38	7	1			
Cuba [2]	24					
Guatemala	181					
Jamaica [2]	20	2	1	2		
Mexico [1]	1,128	24				
Panama Canal Zone [1]	13					
Panama Republic	7					
Puerto Rico [2]	38	2				
SOUTH AMERICA						
Argentina	21					
Bolivia	[8] 93					
Brazil [1]	14	1		1		
Chile [1]	609	5	5	7	9	
Colombia [1]	3,234	[9] 256				
Curacao [2]	22	3				
Ecuador [1]	463	63	2			
Peru	1,667	2				
Venezuela [1]	187	4		1	1	
OCEANIA						
Australia [2]	173	19	1	2		
Hawaii Territory [2]	22	3				
Honolulu	3					
New Caledonia	1					

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Includes murine type. [2] Murine type. [3] Mar. 1-10, 1949. [4] Approximate number reported Feb. 21, 1949, in outbreak in Hebron and Bethlehem districts. [5] Includes suspected cases. [6] Includes nonresident and imported cases. [7] Corrected figure. [8] Includes 9 deaths reported as cases in Cochabamba Department in March 1948. [9] Jan. 1-31, 1949.

YELLOW FEVER

(C—cases; D—deaths)

AFRICA						
Belgian Congo:						
Stanleyville Province D		4		[1] 1		
Gold Coast:						
Kumasi D	1					
Accra D	2					
Ivory Coast:						
Gagnao D	1					
Sudan (French):						
Sebekoro D	1					
NORTH AMERICA						
Panama:						
Pacora C		[3] 8				
SOUTH AMERICA						
Argentina D	1					
Cerro Azul, Misiones Territory D	1					
Bolivia: [3]						
Brazil D	3					
Bahia State:						
Ilheus City, Itajuipe D	1					
Ubaitaba County D	1					
Rio Grande do Sul State:						
Sao Luiz Gonzaga D	[4] 1					
British Guiana D	1					

See footnotes at end of table.

YELLOW FEVER—Continued

Place		January—December 1948	January—February 1949	March 1949—week ended—			
				5	12	19	26
SOUTH AMERICA—continued							
Colombia	D	19					
Antioquia Department:							
Maceo	D	4					
Yolombo	D	1					
Boyaca Department:							
Campohermoso	D	1					
Caldas Department:							
La Dorado	D	1					
Samana	D	1					
La Victoria	D	1					
Cundinamarca Department:							
Medina	D	7					
Intendencia of Meta:							
Cumaral	D	1					
Restrepo	D	1					
San Martin	D	1					
Peru: [5]							
Loreto Department:							
Nauta, Loreto Province	D	1					
San Martin Department:							
Saposoa, Saposoa Province	D	1					
Venezuela:							
Bolivar State:							
Boatanamo, Tumeremo County	D	1					

[1] Reported Mar. 6, 1949, in Titulo Region. [2] Includes 5 fatal cases confirmed, 3 nonfatal cases, not confirmed. [3] Delayed report: During the months of April and May 1947, 5 cases of yellow fever were reported in Bolivia, distributed as follows: Santa Cruz Department—Nuflo de Chavez 1, Concepcion 1, Cercado 1 La Paz Department—Province of Sud Yungas, Chulmani 1, Province of Nor Yungas, Coroico 1. [4] Suspected. [5] Delayed report: On July 23, 1948, 1 death from yellow fever was reported to have occurred in Tingo Maria, Huanoco Department, Peru, in the month of November 1947.

DEATHS DURING WEEK ENDED APR. 2, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Apr. 2, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,819	9,742
Median for 3 prior years	9,742	
Total deaths, first 13 weeks of year	128,641	[illegible]
Deaths under 1 year of age	654	682
Median for 3 prior years	677	
Deaths under 1 year of age, first 13 weeks of year	8,696	9,039
Data from industrial insurance companies:		
Policies in force	70,499,593	71,109,393
Number of death claims	13,318	12,329
Death claims per 1,000 policies in force, annual rate	9.9	9.1
Death claims per 1,000 policies, first 13 weeks of year, annual rate	9.8	10.5

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TUBERCULOSIS CONTROL ISSUE NO. 39

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PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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This is the thirty ninth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear in the first week of each month. The series began with the March 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year, $1.25 foreign.

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Public Health Reports

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Use of Yeast-phase Antigens in a Complement Fixation Test for Histoplasmosis

III. Preliminary Results With Human Sera

By CHARLOTTE C. CAMPBELL, and CAPT. SAMUEL SASLAW, MC, AUS*

Recent reports from this laboratory have described a complement fixation test for the detection in immune rabbit sera of antibodies against *Histoplasma capsulatum*. In one study whole yeast-phase organisms were used as antigen (*1*); in the other, ground yeast-phase antigens were employed (*2*). Since ground antigens offered greater stability and clarity, they were employed in the studies with human sera.

In evaluating the complement fixation test for human sera, we were confronted with the following questions:

1. What is the potential value of the test as an aid to the diagnosis of histoplasmosis?
2. Is there any relationship between histoplasmin skin sensitivity and humoral antibodies against the yeast phase of *H. capsulatum*?
3. Does the skin test *per se* affect antibody levels?
4. Do the cross reactions between *H. capsulatum* and *Blastomyces dermatitidis* noted in studies with immune rabbit serum (*1, 2, 3, 4*) and in guinea pigs (*5, 6*) occur in human material, and, if so, to what extent would they constitute misleading diagnostic criteria?

Materials and Methods

Sera. Sera were classified into three groups. Group I consisted of sera selected at random from specimens submitted for routine Wassermann and Kahn tests for which no skin sensitivity data were available. Group II sera were obtained from normal volunteers immediately prior to and 3 weeks after skin-testing with histoplasmin. All sera in group III were from skin-test-positive persons with proved cases of histoplasmosis. Antibody titrations were made within 24 hours of receipt of the sera, which were inactivated at 56° C. for 30 minutes before use.

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*From the Department of Bacteriology, Army Medical Department Research and Graduate School. The authors wish to acknowledge the technical assistance given by Shirley A Knibb, B. S.

Skin tests. Tests and readings were made in accordance with the directive issued with lot H-40 histoplasmin.[1] Each of the volunteers i Group II received an intracutaneous injection (on the anterior surface of the forearm) of 0.1 ml. of a 1:1,000 dilution of test material. Readings were made 48 hours later and reactions showing induration or edema measuring 5 mm. or more in diameter were considered positive.

Complement fixation test. The complement fixation test was conducted as described in our original report (*2*), except for the modifications noted below.

Antigens. Optimal dilutions of ground histoplasma antigens were determined by titration in the presence of strong positive serum obtained from persons in the acute phase of histoplasmosis. This antigen was prepared from the G-2 [2] strain of *H. capsulatum.* In cross-reaction studies the A-5 [3] strain of *B. dermatitidis* was employed as antigen. The optimal dilution for this antigen was determined by titration in the presence of serum from a proved case of systemic blastomycosis.

Incubation. For comparative purposes, 4- and 18-hour periods of incubation at 3° to 6° C. were allowed for complement fixation in the first experiment. For reasons described below, all subsequent tests were incubated for the shorter period.

Results

Group I. In this experiment, 316 sera which had been submitted for routine Kahn and Wassermann tests were examined for antibody content. The sera were incubated for 18 hours at 3° to 6° C. Eighty-five (26.9 percent) of these specimens fixed complement in serum dilutions varying from 1:10 to 1:40. Thirty-eight (12 percent) of the sera fixed complement through serum dilutions of 1:10; 35 (11 percent) through 1:20; and 12 (3.8 percent) through 1:40. This number of "positives" in "normal" sera seemed rather high for a specific test.

The studies of Kent and Rein in amebiasis (*7*) demonstrated that the incidence of false positive reactions was considerably reduced when 4-hour, rather than 18-hour, incubation periods were used. On the basis of these findings, 135 additional sera were titrated simultaneously in duplicate tests in which an incubation period of 4 hours at 3° to

---

[1] The histoplasmin was prepared, standardized and supplied through the generosity of Dr Arden Howell, Jr , Public Health Service, Duke University

[2] Strain [illegible] (*H. capsulatum*) from the collection of Dr N F Conant, Duke University

[3] Strain 930 (*B dermatitidis*) from the collection of Dr. Conant

6° C. was allowed for fixation in one set, and 18 hours in the second. Optimal dilutions of antigen were previously determined with positive serum under the two different conditions of the test. As noted in table 1, after 4 hours' incubation, only 8 or 5.9 percent of the sera fixed complement, as compared to 47 or 34.7 percent after 18 hours' incubation. In the 4-hour group, 6 (4.4 percent) serum specimens reacted at 1:10 dilution; 2 (1.5 percent) at 1:20; and none at 1:40. The positive serum control in the 4-hour test fixed complement in a dilution of 1:320, while in the 18-hour test, the titer was 1:640. The results tabulated in table 1 demonstrate that the titer of the positive serum control was reduced by only one dilution in the 4-hour test, while the number of test sera reacting at any dilution was considerably lower than in the 18-hour test. These findings suggest that the "positive" reactions appearing in the lower serum dilutions during the longer period of incubation were nonspecific. Therefore, in our subsequent studies with human sera, the time allowed for fixation of complement was limited to 4 hours.

TABLE 1.—*Results of duplicate tests with 135 sera from normal volunteers, allowing 4 and 18 hours at 3°–6° C. for fixation of complement, and employing an optimal dilution of G 2 ground antigen*

Serum dilution	18 hrs at 3°–6° C.			4 hrs at 3°–6° C.		
	Number of sera reacting	Percentage of sera reacting	Positive control serum titer	Number of sera reacting	Percentage of sera reacting	Positive control serum titer
1:10	20	14.8	1:640	[1]6	4.4	1:320
1:20	21	15.5		[2]2	1.5	
1:40	6	4.4		0		
	47	34.7		8	5.9	

[1] After 18 hours' incubation, 4 of the 6 sera had given titers of 1:40, while 2 had reacted at 1:20.

[2] Both sera had titers of 1:40 after 18 hours' incubation.

Group II. The sera for group II were obtained from 207 normal volunteers who were skin-tested simultaneously with histoplasmin. Of this number, 118 were healthy civilian persons employed in the laboratories of the Army Medical Department Research and Graduate School and 89 were orthopedic patients at Walter Reed General Hospital. This group represented a diverse geographic population including natives of 40 States, Canada, the Philippine Islands, Turkey, and Brazil. Only 13 were natives of the District of Columbia.

As noted in table 2, 73 (35.2 percent) persons were skin-test-positive, and the sera of 16 (7.7 percent) fixed complement in low dilutions (1:10 to 1:40). Considering the group as a whole, 10 (13.7 percent) of the reacting sera were from the 73 skin-test-positive persons, and 6 (4.5 percent) were from the 134 skin-test-negative individuals. Further analysis of these data reveals that among the sera from the civilian group of 118 those which fixed complement in low dilution were from skin-test-positive persons originally living in areas considered endemic for histoplasmosis. None of the negative reactors in this set showed complement-fixing antibodies. On the other hand, all of the six serum specimens from skin-test-negative individuals which fixed complement in low dilution were from Army patient personnel. This latter group, because of service tours in Army installations throughout many parts of the world, has undoubtedly been subject to a number of natural and protective immunizations not represented in the civilian group. However, since this latter observation is difficult to evaluate, calculations for this study (table 2) were based on the total number of 207 volunteers.

TABLE 2.—*Classification of 207 normal volunteers according to histoplasmin sensitivity and complement fixation capacity of sera*

Number of persons	Skin sensitivity to H 40	Number of sera fixing complement			Total	Percent positive
		Serum dilutions				
		1:10	1:20	1:40		
73	Positive	6	2	2	10	13.7
134	Negative	5	1	0	6	4.5
Total 207		11	3	2	16	..

Twenty days after the intracutaneous administration of histoplasmin, second specimens of sera were obtained from the 118 healthy civilian volunteers in group II. These were again titrated for antibodies with ground yeast-phase antigens of *H. capsulatum*. The results of the complement-fixation tests were exactly the same as those observed with the first serum specimens taken from this group. Sera which did not fix complement before skin-testing were also negative 20 days later, and the titers of the "positive" sera showed no increase. If a detectable antibody increase had occurred in the interim because of skin-testing with histoplasmin, it was of extremely short duration. Nevertheless, it can be assumed that the single skin test *per se* did not stimulate any antibodies which could be detected approximately 3 weeks later.

Group III. Sera from seven skin-test-positive, proved cases of histoplasmosis were titrated for antibodies against *H. capsulatum*. Three of the patients were in the acute phase of the disease. As shown in table 3, the serum of case 1, taken 15 days after the onset of illness, fixed complement through a dilution of 1:1280. Twenty-seven and 42 days later, second and third specimens, respectively, showed a drop in titer to 1:640. A fourth specimen obtained on the seventy-eighth

CORRECTION

insert as page 562a in

Public Health Reports Vol. 64, No. 18, May 6, 1949

Tuberculosis Control Issue No. 39

The legends for figures 1 to 10 in the article "Persistence of Fluoroscopic Screens," by Willard W. Van Allen were omitted. The legends follow:

Figure 1. Schematic diagram of apparatus used for measuring the phosphorescence of fluoroscopic screens. A, photoelectric cell; B, lead glass filter; C, neutral density shutter; D, screen under test; E, solenoid to operate shutter; F, voltage dividing resistors for photocell; G, light-tight cover; H, light-tight case and electrostatic shield; J, cables to batteries, main contactor, and recorder; K, exciting radiation.

Figure 2. Typical record of the decay of posphorescence as recorded on an electrocardiograph.

Figure 3. Curves showing the decay of phosphorescence for four different screens. A, after 0.1-second exposure; B, after 0.3-second exposure; C, after 0.5-second exposure; D, after 1.0-second exposure. All exposures made at 85 kv., 100 ma., through a phantom of 10 cm. of Masonite presdwood and at a target-screen distance of 40 inches.

Figure 4. Schematic diagram of apparatus used to measure photographically the persistence exposure. A, unrestricted port to allow film to receive total exposure; B, shutter-controlled port to restrict film exposure to that due to persistence; C, shutter; D, solenoid to operate shutter.

Figure 5. Curves showing the relation between the conditions of excitation and the quantity of light emitted by screens during the period of phosphorescence.

Figure 6. Curves showing the average exposure due to persistence expressed as percentage of the exciting exposure. A, older D type screen showing long persistence, B, recent D-type screen; C, 666D screen; D, E 2 type screen; E, B-type screen.

Figure 7. Characteristic Density—Log Exposure curve for a typical photofluorographic film. Solid curve shows densities for normal exposure. Dashed curves show corresponding densities for exposures of 10%, 20% and 30%, respectively, of the exposures referred to the solid line.

Figure 8. Curves showing the progress with time of exposures due to persistence, expressed as percent of the total persistence exposure. B, long-persistence screens, type D; C, medium-persistence screens, type 666D, D, short-persistence screens, type E-2 and B. (Curves labeled to correspond to figure 6.)

Figure 9. Curves showing the rate of decay of phosphorescence after a series of 3 exposures per minute for 1 hour. A, after the first exposure on a rested screen; B, after the last exposure of the series. All exposures are 0.3 second at 85 kv., 100 ma., through 10 cm of presdwood at a target-screen distance of 40 inches.

Figure 10. Curves showing the exposure, due to persistence after a series o exciting exposures. 0.1-second exposures at the rate of 12 per minute for minutes 0.3-second exposures at the rate of 3 per minute for 1 hour. Al exposures at 85 kv., 100 ma., through a 10 cm. phantom of presdwood at a tar get-screen distance of 40 inches. A, long-persistence D-type screen; B, shor persistence D-type screen, C, 666D screen; D, E-2 screen; E, B-type screen

group of 118 those which fixed complement in low dilution were from skin-test-positive persons originally living in areas considered endemic for histoplasmosis. None of the negative reactors in this set showed complement-fixing antibodies. On the other hand, all of the six serum specimens from skin-test-negative individuals which fixed complement in low dilution were from Army patient personnel. This latter group, because of service tours in Army installations throughout many parts of the world, has undoubtedly been subject to a number of natural and protective immunizations not represented in the civilian group. However, since this latter observation is difficult to evaluate, calculations for this study (table 2) were based on the total number of 207 volunteers.

TABLE 2.—*Classification of 207 normal volunteers according to histoplasmin sensitivity and complement fixation capacity of sera*

Number of persons		Skin sensitivity to H 40	Number of sera fixing complement			Total	Percent positive
			Serum dilutions				
			1:10	1:20	1:40		
	73	Positive	6	2	2	10	13.7
	134	Negative	5	1	0	6	4.5
Total	207		11	3	2	16	--

Twenty days after the intracutaneous administration of histoplasmin, second specimens of sera were obtained from the 118 healthy civilian volunteers in group II. These were again titrated for antibodies with ground yeast-phase antigens of *H. capsulatum* The results of the complement-fixation tests were exactly the same as those observed with the first serum specimens taken from this group. Sera which did not fix complement before skin-testing were also negative 20 days later, and the titers of the "positive" sera showed no increase. If a detectable antibody increase had occurred in the interim because of skin-testing with histoplasmin, it was of extremely short duration. Nevertheless, it can be assumed that the single skin test *per se* did not stimulate any antibodies which could be detected approximately 3 weeks later.

Group III. Sera from seven skin-test-positive, proved cases of histoplasmosis were titrated for antibodies against *H. capsulatum*. Three of the patients were in the acute phase of the disease. As shown in table 3, the serum of case 1, taken 15 days after the onset of illness, fixed complement through a dilution of 1:1280. Twenty-seven and 42 days later, second and third specimens, respectively, showed a drop in titer to 1:640. A fourth specimen obtained on the seventy-eighth

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Tuberculosis Control Issue No. 39

The legends for figures 1 to 10 in the article "Persistence of Fluoroscopic Screens," by Willard W. Van Allen were omitted. The legends follow:

Figure 1. Schematic diagram of apparatus used for measuring the phosphorescence of fluoroscopic screens. A, photoelectric cell; B, lead glass filter; C, neutral density shutter; D, screen under test; E, solenoid to operate shutter; F, voltage dividing resistors for photocell; G, light-tight cover; H, light-tight case and electrostatic shield; J, cables to batteries, main contactor, and recorder; K, exciting radiation.

Figure 2. Typical record of the decay of posphorescence as recorded on an electrocardiograph.

Figure 3. Curves showing the decay of phosphorescence for four different screens. A, after 0.1-second exposure; B, after 0.3-second exposure; C, after 0.5-second exposure; D, after 1.0-second exposure. All exposures made at 85 kv., 100 ma., through a phantom of 10 cm. of Masonite presdwood and at a target-screen distance of 40 inches.

Figure 4. Schematic diagram of apparatus used to measure photographically the persistence exposure. A, unrestricted port to allow film to receive total exposure; B, shutter-controlled port to restrict film exposure to that due to persistence; C, shutter; D, solenoid to operate shutter.

Figure 5. Curves showing the relation between the conditions of excitation and the quantity of light emitted by screens during the period of phosphorescence.

Figure 6. Curves showing the average exposure due to persistence expressed as percentage of the exciting exposure. A, older D-type screen showing long persistence; B, recent D-type screen; C, 666D screen; D, E–2 type screen; E, B-type screen.

Figure 7. Characteristic Density—Log Exposure curve for a typical photofluorographic film. Solid curve shows densities for normal exposure. Dashed curves show corresponding densities for exposures of 10%, 20% and 30%, respectively, of the exposures referred to the solid line.

Figure 8. Curves showing the progress with time of exposures due to persistence, expressed as percent of the total persistence exposure. B, long-persistence screens, type D; C, medium-persistence screens, type 666D; D, short-persistence screens, type E–2 and B. (Curves labeled to correspond to figure 6.)

Figure 9. Curves showing the rate of decay of phosphorescence after a series of 3 exposures per minute for 1 hour. A, after the first exposure on a rested screen; B, after the last exposure of the series. All exposures are 0.3 second at 85 kv., 100 ma., through 10 cm. of presdwood at a target-screen distance of 40 inches.

Figure 10. Curves showing the exposure due to persistence after a series of exciting exposures. 0.1-second exposures at the rate of 12 per minute for 5 minutes. 0.3-second exposures at the rate of 3 per minute for 1 hour. All exposures at 85 kv., 100 ma., through a 10 cm. phantom of presdwood at a target-screen distance of 40 inches. A, long-persistence D-type screen; B, short persistence D-type screen; C, 666D screen; D, E–2 screen; E, B-type screen.

Table 3.—*Results of complement fixation tests employing an optimal dilution of C-2 histoplasma antigen, and related data in 7 cases of histoplasmosis with positive skin tests*

Case number	Phase of disease	Serum specimen number	Intervals between specimens (days)	Complement fixation titers, serum dilutions 1:10	1:20	1:40	1:80	1:160	1:320	1:640	1:1280	1:2560
				Percent								
1	Acute	1	([1])	0	0	0	0	0	0	0	0	70
		2	12	0	0	0	0	0	0	10	85	100
		3	15	0	0	0	0	0	0	50	100	100
		4	36	0	0	0	50	100	100	100	100	100
		5	56	10	20	45	100	100	100	100	100	100
2	do	1	( )	0	0	50	100	100	100	100	100	100
		2	27	0	0	0	0	45	100	100	100	100
3	do	1		0	0	0	0	0	60	100	100	100
4	Chronic	1		0	20	95	100	100	100	100	100	100
		2	30	0	35	100	100	100	100	100	100	100
5	do	1		0	0	40	95	100	100	100	100	100
		2	30	0	15	95	100	100	100	100	100	100
6	do	1		[3] ac								
		2	30	[3] ac								
7	do	1		100	100	100	100	100	100	100	100	100
		2	7	100	100	100	100	100	100	100	100	100
		3	7	100	100	100	100	100	100	100	100	100
		4	7	100	100	100	100	100	100	100	100	100
		5	7	100	100	100	100	100	100	100	100	100
		6	7	100	100	100	100	100	100	100	100	100

[1] 15th day of illness [2] 13th day of illness [3] Anticomplementary

0=no hemolysis (complete fixation) 100=complete hemolysis (no fixation) the titer was taken as being the highest dilution of serum showing 50 percent or less of hemolysis

Controls Antigen 100 percent complement 100 percent cells 0 percent

day of illness had a titer of only 1:80, while on the one hundred and thirty-fourth day the serum fixed complement up to a 1:40 dilution After the initial onset of the disease, this patient had shown gradual clinical improvement.

The first serum specimen taken from case 2 on the thirteenth day of illness was positive at 1:40, 27 days later the titer of his serum had increased to 1:160. A single serum sample from case 3 taken in the acute phase of the disease fixed complement completely through a dilution of 1:160.

Two serum specimens, collected 1 month apart, were obtained from three chronically ill patients (cases 4, 5, 6) whose diagnosis of histoplasmosis was of 2 to 5 years' duration. The first serum samples from cases 4 and 5 fixed complement through 1:20 and 1:40 dilutions, respectively, while that from case 6 was anticomplementary. Second specimens from cases 4 and 5 each fixed complement through 1:20 dilutions of serum. Serum specimens obtained from case 7 at weekly intervals for 8 weeks consistently failed to fix complement in serum dilutions of 1:10.

The titers of the above sera from the three persons in the acute phase of the disease were significantly greater than any of the reactions observed either in the sera from the chronic cases of histoplasmosis or in normal sera. This observation is essentially in accord with that made when sera were tested for antibodies with histoplasmin by means of the collodion agglutination technique (*8*).

Because of the limited amount of serum available from this group, the cross relationship between *H. capsulatum* and *B. dermatitidis* which had been noted in immune rabbit sera (*1*, *2*, *3*, *4*) could be studied only with five human sera. These were titrated for antibodies with dilutions of ground yeast-phase antigens of both *H. capsulatum* and *B. dermatitidis*. As shown in table 4, one serum specimen having a titer of 1:160 with histoplasma antigen (223) fixed complement through a dilution of 1:40 with the blastomyces antigen. Two other sera (206, 225) which had reacted to histoplasma antigen in 1:20 and 1:40 dilutions, respectively, fixed complement in 1:10 dilutions when blastomyces antigens were used. Two serum samples (325, 327) from different cases of systemic blastomycosis with specific titers of only 1:10 did not react in the presence of the histoplasma antigens. These results, although unavoidably very limited in scope, were analagous to those observed in rabbit sera.

TABLE 4.—*Cross reactions in the complement fixation test employing optimal dilutions of ground antigens from the G-2 strain of* H. capsulatum *and the A-5 strain of* B. dermatitidis *and sera from proved cases of histoplasmosis and blastomycosis*

Sera	G-2 antigen									Serum titer
	Serum dilutions						Controls			
	1:10	1:20	1:40	1:80	1:160	1:320	Ant	Comp	Cells	
	Percent									
206 [1]	0	0	75	100	100	100	100	100	0	1:20
223 [1]	0	0	0	0	40	95				1:160
225 [1]	0	0	0	60	100	100				1:40
325 [2]	70	100	100	100	100	100				0
327 [2]	95	100	100	100	100	100				0

Sera	A-5 antigen									Serum titer
	Serum dilutions						Controls			
	1:10	1:20	1:40	1:80	1:160	1:320	Ant	Comp	Cells	
	Percent									
206 [1]	10	90	100	100	100	100	100	100	0	1:10
223 [1]	0	10	20	95	100	100				1:40
225 [1]	0	90	100	100	100	100				1:10
325 [2]	40	100	100	100	100	100				1:10
327 [2]	50	100	100	100	100	100				1:10

[1] Serum from proved cases of histoplasmosis

[2] Serum from proved case of blastomycosis

0=no hemolysis (complete fixation), 100=complete hemolysis (no fixation), the titer was taken as being the highest dilution of serum showing 50 percent or less of hemolysis

Discussion

The primary purpose of this study was to develop a test for the detection of antibodies against *H. capsulatum* which would insure maximum specificity. Kent and Rein (*7*), in complement fixation studies of amebiasis, reported the value of a 4-hour incubation period in reducing the number of false positive reactions. The use of this time factor, rather than one of 18 hours, in the present work proved valuable in decreasing the reactivity of "normal" sera from 26.9 percent at the longer incubation period to 5.9 percent at 4 hours. Thus, the 4-hour incubation period was confirmed in this study as a means of improving the specificity of the complement fixation test.

Next, this study attempted to determine whether any relationship exists between skin sensitivity to histoplasmin (a filtrate of the mycelial phase of *H. capsulatum*) and humoral antibodies against the yeast phase of the organism. Results of this investigation suggest that such antibodies are more likely to occur in skin-test-positive persons. The positive serum reactions in this study, however, were far weaker than those observed in sera of persons with acute histoplasmosis.

The possible value of the complement fixation test as a diagnostic tool in histoplasmosis was suggested by the observation that the serum titers of three patients in the early acute phase of the disease was considerably higher than any reaction noted in the sera of "normal" persons. In one case, the gradual decrease of serum antibody from 1:1280 on the 15th day of illness to 1:40 on the 134th day, as well as the low titers observed in two chronic cases, and the complete absence of detectable antibody in a third, suggests that the humoral response of the host is transitory. The titers of the chronically ill persons known to have had the disease for 2 to 5 years did not differ appreciably from those observed in a very low percentage of individuals in a normal population which may or may not have been previously exposed to histoplasmosis. Thus, it is possible to assume that a high antibody titer against *H. capsulatum* may be of value to the clinician as an aid in diagnosis. In fact, culture for the organism in two cases in this series was instigated only after the marked antibody content of the serum had been discovered. The ease with which the organism was isolated by blood culture in this instance suggests that the test may also be of value in indicating the most propitious time for attempting to isolate the organism, thereby facilitating rapid and certain diagnosis. Since similar results were recorded in our studies employing the collodion agglutination technique (*8*), it is our belief that the continuation of serologic studies of an accumulated number of cases will add substantially to the understanding of the exact nature of histoplasmosis.

There is relatively little data on complement fixation studies available for comparative purposes. Salvin (*9*), using yeast-phase antigens, reported titers of 1:32 and 1:128, respectively, in single serum specimens from two patients with histoplasmosis. Furcolow, Bunnell, and Tenenberg (*10*) have reported interesting results in complement fixation studies employing histoplasmin as antigen. An accurate comparison between their data and ours is difficult, however, because of several factors: (1) Ground yeast-phase antigens were employed in our test, while histoplasmin was used in the above study; (2) our test is quantitative in that it employs the 50 percent end-point of hemolysis and serial serum dilutions, instead of a graded intensity of reactions with undiluted serum; (3) the stages of the disease have not been specifically designated in the cited studies. Despite these differences, results indicate a similar trend. Furcolow et al. report that 242 miscellaneous "control" cases yielded 5.4 percent reactions (3+ and 2+). Eight (5.9 percent) of our 135 random serum samples, and 16 (7.7 percent) of the 207 volunteers were positive in low dilution, resulting in a total of 24 or 7 percent positive sera in a group of 342 persons. These figures of 5.4 percent and 7 percent are remarkably close for such small groups. The demonstration of antibodies in 8 of 9 proved cases and in 10 of 36 suspected cases of histoplasmosis by the Kansas group and the results obtained in this laboratory suggest the potential value of serologic tests as an aid to diagnosis. The accumulation of more data will be required before the tests can be adequately evaluated, however.

The cross reaction between *H. capsulatum* and *B. dermatitidis* noted in our earlier studies with rabbit antisera (*1*, *2*, *3*, *4*) was observed to occur as well in human sera, where the cross was again more marked between blastomyces antigen and histoplasma serum than between histoplasma antigen and blastomyces antisera. It should be noted that none of the available titers of blastomyces sera was higher than 1:10. In Martin's summary of 22 cases (*11*), including both cutaneous and generalized blastomycosis, the highest complement fixation titer observed was 1:32. Since we have found the immunogenic capacity of *B. dermatitidis* to be much less than *H. capsulatum* in rabbits (*1*), it is possible that the organism does not incite a marked antibody increase in the human host during any stage of the disease. If such a postulate is correct there is little danger that serologic data based on the use of either blastomyces or histoplasma antigen alone could be misinterpreted. However, until it is proved otherwise, it should be assumed that at some stage of blastomycosis the serum titer may be markedly increased, just as in histoplasmosis, and that in this stage of the disease the cross reaction with histoplasma antigen would also be increased. The serologic picture resulting from the use of histoplasma antigen alone would, in such an instance, be completely misleading.

Histoplasma sera apparently react with blastomyces antigens in a ratio proportionate to the specific titer of the serum. As the titer increases with specific antigen, it increases also with blastomyces antigen. When both antigens are employed simultaneously it is immediately obvious that the titer with specific antigen is always several dilutions higher than with blastomyces antigen, and results are easily interpreted. Conversely, it is conceivable that a histoplasma serum of high titer used only with blastomyces antigen could, as in the above, obscure exact diagnosis. For these reasons, both antigens will in the future be used in this laboratory with all sera suspected of having antibodies against either *H. capsulatum* or *B. dermatitidis.*

During the development and use of serologic methods, the question often arises as to whether skin-testing agents *per se* stimulate antibody production. Three weeks after "normal" persons were given a single intradermal injection of histoplasmin, no stimulatory effect was noted. The sera of those persons previously showing some complement-fixing antibodies evidenced no detectable increase in titer; also, sera which had been negative prior to skin testing were likewise negative 20 days later. If any antibody response had occurred, it was of such a transient nature as to be absent approximately 3 weeks after skin testing with histoplasmin.

Summary

1. A complement fixation test for histoplasmosis utilizing ground yeast-phase antigens of *H. capsulatum* has been described.
2. Four-hour incubation periods at 3° to 6° C. for fixation of complement were less likely to yield nonspecific reactions than 18-hour periods.
3. Sera from three cases of acute histoplasmosis fixed complement in high titer, while sera from three chronic cases did not vary appreciably from the titers found in a small percentage (5.9 to 7.7 percent) of a "normal" population.
4. In a group of 207 volunteers, humoral antibodies occurred in 10 of 73 skin-test-positive persons and 6 of 134 skin-test-negative individuals.
5. Skin testing with histoplasmin did not incite any antibody response that was detectable 20 days after the tests.
6. The cross reaction between *H. capsulatum* and *B. dermatitidis* was further demonstrated.
7. The potential value of complement fixation studies as an aid to the diagnosis of histoplasmosis was demonstrated.

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Persistence of Fluoroscopic Screens

By Willard W. Van Allen, B Sc.*

Radiographic intensifying and fluoroscopic screens, in common with other devices using phosphors for the conversion of radiant energy into visible light, exhibit the phenomenon known as persistence or lag. This means that the phosphor continues to emit light for an appreciable time after the exciting radiation has stopped. It has long been recognized that the light emission from a phosphor consists of two distinct types: fluorescence during excitation, and phosphorescence after excitation. These two types of emission differ from each other both in the mechanism by which they are produced and in their characteristics of wave length and duration. The phosphorescent emission is of longer wave length than the corresponding fluorescent emission and lasts for some time after the termination of the exciting exposure; whereas fluorescence occurs only during, or, at the most, for a few micro-seconds after excitation. The mechanism of these phenomena has been discussed by Mott and Gurney (*1*), Hirschlaff (*2*), Riehl (*3*) and others.

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The screens used in roentgenography may be devided conveniéntly into three groups; the intensifying screens, fluoroscopic screens used for visual examination, and screens used in photofluorography. There is overlapping of the last two groups, since many screens are used both for fluoroscopy and photofluorography. Persistence in screens of each of these groups presents different aspects and assumes different degrees of importance.

In the case of intensifying screens, persistence is negligible. In fact, the period of phosphorescence in those intensifying screens studied by this laboratory is so short that it cannot be measured by the methods to be described.

Fluoroscopic screens are available with almost any degree of persistence ranging from a few hundredths of a second to many minutes or even longer. Fluoroscopic screens having a long persistence are objectionable for diagnostic examinations since afterimages, due to lag, tend to obscure the outlines being observed whenever the screen is moved. Likewise the outlines of moving structures under observation are blurred. In view of the inefficient viewing conditions prevailing in fluoroscopy, therefore, it is important that screens used for this purpose have low lag.

Persistence in screens intended for photofluorographic use has been the subject of much discussion and many complaints. With the development of techniques allowing or requiring exposures in rapid succession, the importance of persistence in screens becomes of greater moment. It is the purpose of this study to present quantative data on the persistence characteristics of commonly used screens and the effects of this persistence on the film.

Two years ago the Electronic Laboratory of the Public Health Service measured the rate of decay of the persistence of a large number of screens (*4*). However, no attempt was made at that time to determine the extent of objectionable effects resulting from screen lag. What is required in order to evaluate a particular screen is not only the rate of decay of phosphorescence, but also the total quantity of light emitted during the period of persistence.

In order to measure and record the intensity and rate of decay of phosphorescence in an excited screen, the following apparatus was devised. A photoelectric cell of the multiplier type was arranged to receive the light emitted from the screen under examination. Since the light emitted during the period of excitation is several hundred times as intense as that emitted during the greater part of the period of phosphorescence, a shutter of neutral density was arranged to operate in conjunction with the exposure control switch. During the exciting exposure this shutter is interposed between the screen and the photocell and is withdrawn immediately upon completion of the exposure. The output of the photocell is fed to the galvanometer string of an electrocardiograph which serves as a recording microammeter. The electrocardiograph was used as the recording instrument merely because it was available and served the purpose. Obviously any other device of comparable sensitivity and low inertia would serve as well. For recording persistence of duration longer than a few seconds, a Micromax recorder of 5 millivolt sensitivity was used. Schematic diagrams of the apparatus and circuit are shown in figure 1. A typical recording is shown in figure 2. The length and intensity of

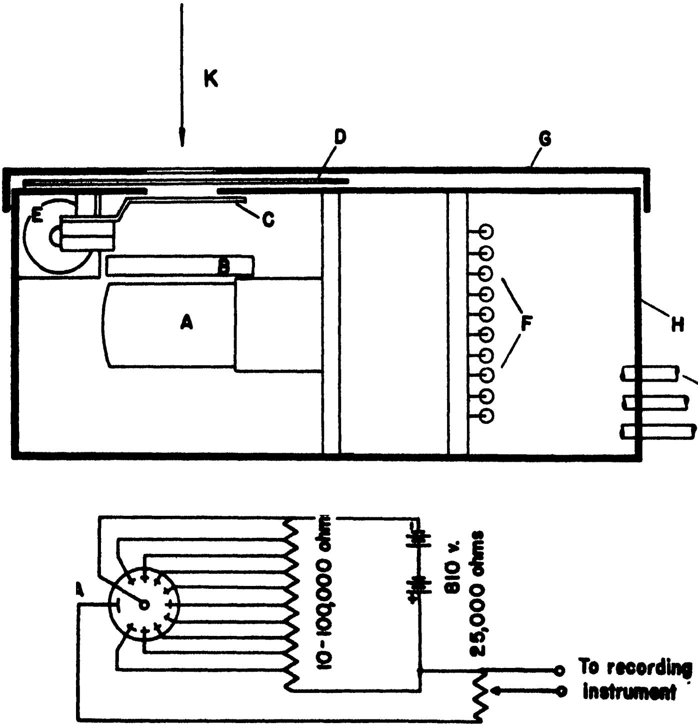

Figure 1

the exciting exposure are recorded as the broad horizontal trace, and the persistence intensity is shown by the curve. The density of the shutter used was 2.48, corresponding to a transmission of 1/300. Hence the intensity of illumination during exposure is the average

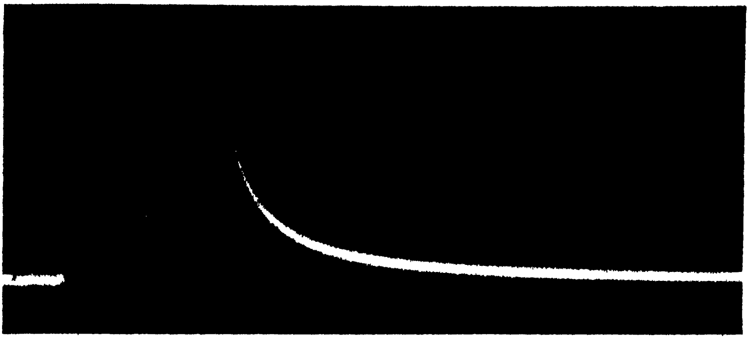

Figure 2

ordinate of the horizontal trace above the zero line multiplied by 300. The persistence intensities, expressed as percent of the exciting intensity, may then be readily determined for any time following termination of the exposure. Preliminary tests established the linearity of the system, and the inherent time delay of the apparatus and circuit as less than 0.02 second.

Using this apparatus, curves showing the decay of persistence are readily obtained for any type of screen and under any desired conditions of excitation. Figure 3 shows decay curves obtained in this manner for four typical fluoroscopic screens. For the examples in figure 3, exposures were made at 85 kilovolts peak, 100 milliamperes through a phantom of 10 centimeters of Masonite presdwood [1] and at a target-screen distance of 40 inches. Curve *A* shows the decay of phosphorescence following a 0.1-second exposure, and curves *B*, *C*, and *D* show the decay following a 0.3-, 0.5-, and 1.0-second exposure respectively. In each case the intensity of illumination is expressed as percent of the intensity during exposure. It will be noted from these curves that there is a wide variation in the persistence of phosphorescence among these screens, at least during the period of low intensity. Attention should be paid not only to the time required for the intensity to fall to a particular fraction of the original brightness, but also to the slope of the decay curve at this point. For example, the B-type screen requires about 1 second to fall to 0.01 percent of its original brightness and the phosphorescence at this level is still decreasing rapidly. On the other hand, by comparison, the other screens require a longer time to reach this level of brightness and the rate of decay at this point is much slower, indicating that phosphorescence of low intensity will continue for a longer time.

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[1] A phantom of 10 cm of Masonite presdwood has been shown by Chamberlain to be equivalent to the average chest. See Chamberlain, E W Fluoroscopes and fluoroscopy Radiology, 38: 383 (1942)

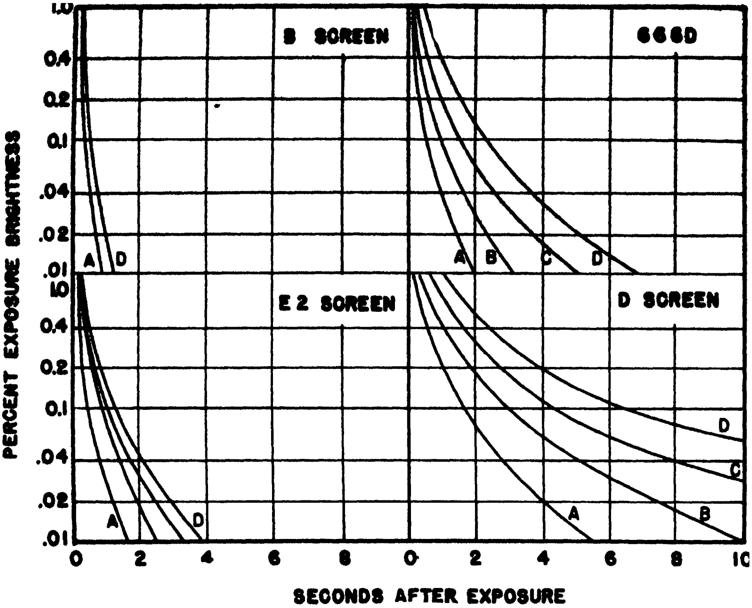

Figure 3

It is important, however, to consider the total quantity of light emitted during the period of phosphorescence, since it is this total quantity of light which determines the magnitude of adverse effects on the film exposed to it. Mathematically, this quantity of light is expressed by $\int i\,dt$, where i is the intensity of phosphorescence at any time t, and represents the area under the decay curve. This area may be measured directly by means of a planimeter, or the integral evaluated mathematically, provided the decay function can be discovered. The quantity of light may also be measured photographically. Examination of the decay curves shows that the decay during the first few hundredths of a second may be closely approximated by an exponential function of the form

while the greater part of the period of decay follows closely the hyperbolic form

$$i=at^{-b}$$

where: i is the intensity at any time t,
i_0 is the original brightness during excitation, and
a', b, c are constants readily determined from graphs.

Using these equations, values may be obtained by integration for the quantity of light emitted during phosphorescence.

The following method was devised in order to obtain direct measurements by photographic methods of the light emitted during phosphorescence, both as a check on the mathematical approximations described above and to take into account possible variations in the effect on the film due to quality of the light emitted.

Apparatus, shown diagrammatically in figure 4, was constructed, consisting essentially of two sheets of steel pierced, as shown, by two holes to allow transmission of light. A light-opaque shutter is arranged between the two metal sheets and operated by a solenoid in such manner that during the exciting exposure one of the two apertures in the plate is closed. The shutter opens immediately upon termination of the exciting exposure The screen under examination is placed on one side of the holder, a film on the other side and a suitable light-tight cover fitted in place. This cover is of thin aluminum to allow passage of the exciting radiation. Thus the film receives the total exposure through the unrestricted port, but only the exposure due to persistence through the other. Since the intensity of the total exposure under these conditions with film and screen in close proximity is much greater than it would be for the same exciting energy in a photofluorograph, it was necessary to place neutral filters of known transmission over the unrestricted port in order to reduce the exposure to a value which could be recorded on the film in its useful range. Also corrections are necessary for density produced on the film by direct roentgen exposure through the ports and shutter The speed of the shutter was determined, and it was found that the shutter required 0.02 second to open after termination of the exposure.

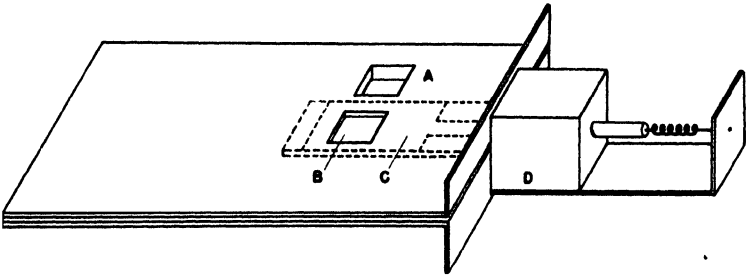

Figure 4

Using this apparatus, exposures were made under the same conditions of time, kilovoltage, current, and filtration as with the photoelectric recording system. The densities recorded by the film through the two ports were measured and each density corrected for fog, filtration, and direct roentgen exposure. From the characteristic $D=\log E$ curve of the film the ratio of the exposure due to persistence to the exciting exposure was determined. These ratios were much lower than those predicted by the mathematical and mechanical determinations. The discrepancy was due to the time lag in the shutter and led to a greater appreciation of the rapidity with which the persistence exposure progresses, as will be shown below. When the exposure during the first 0.02 second was subtracted from the mathematically determined quantity, the results obtained photographically checked closely with the other determinations. In fact, the values obtained by mechanical integration with the planimeter, by mathematical integration of the assumed functions, and photographically, were so close that confidence could be placed in the adequacy of any one of the three methods.

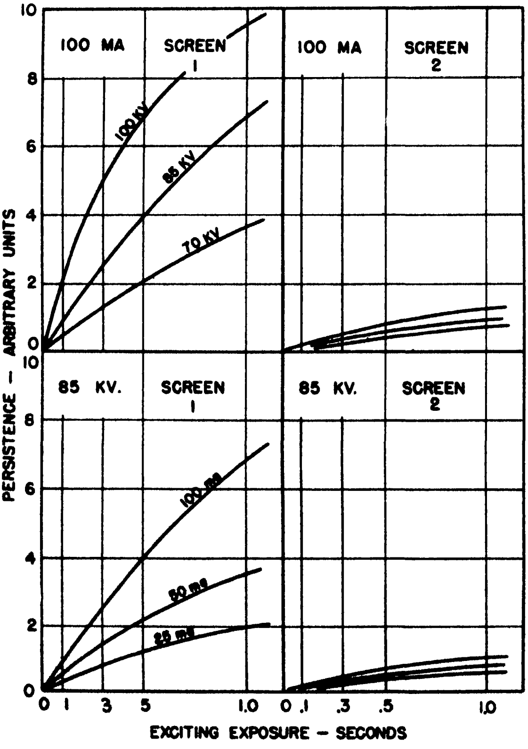

Figure 5

In order to investigate the factors determining the amount of persistence encountered under various conditions, tests were made according to the experimental techniques outlined above at 70, 85, and 100 kilovolts, 25, 50, and 100 milliamperes and with exciting exposures of 0.1-, 0.3-, 0.5-, and 1.0-second duration. In each case the exposures were made at a target-screen distance of 40 inches through a phantom of 10 centimeters of presdwood. Curves showing the relation between exposure and persistence for two types of screens are shown in figure 5. It will be noted that the persistence increases with kilovoltage, milliamperage, and time. In other words, the persistence increases as the intensity of excitation and the length of excitation increase. Furthermore, the increase in persistence with excitation intensity— that is, the brightness of the screen during exposure—is roughly proportional. These curves show the total quantity of light emitted during the period of phosphorescence.

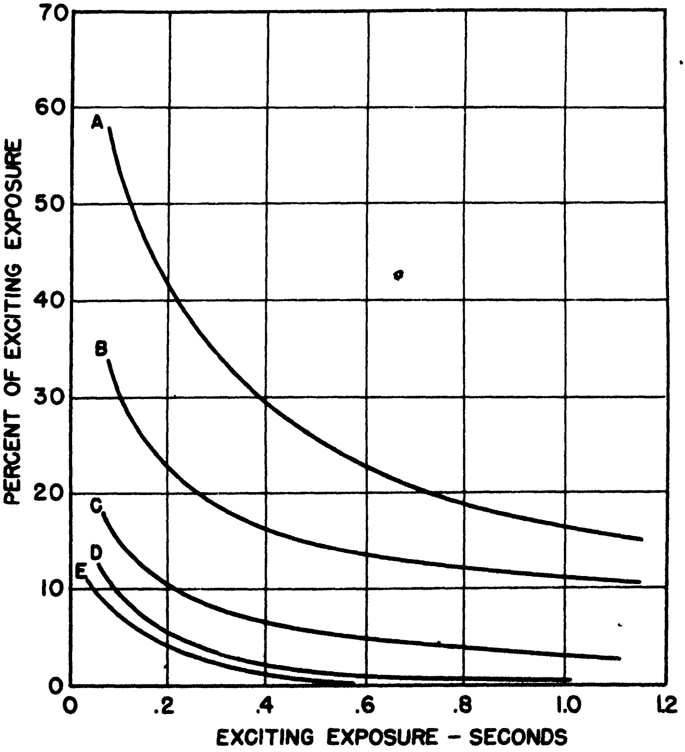

Figure 6

Of greater interest, however, is the amount of persistence expressed as percent of the exciting exposure. Since, as pointed out in figure 5, the persistence is roughly proportional to the intensity of excitation, it is not surprising to find that, for exposures of equal duration, the exposure due to persistence is very nearly the same percent of the exciting exposure regardless of the intensity of excitation, at least within the range investigated. Figure 6 shows the average exposure due to persistence following exciting exposures in the range from 0.1 to 1.0 second expressed as percent of the exciting exposure. Five types of screens are used as illustrations; curve *A*, for an older type of D screen showing considerable persistence; curve *B*, for a recent D-type screen; curve *C*, for a 666D screen; curve *D*, for an E-2 screen; and curve *E*, for a B-type screen. It will be observed that for short exposures the persistence exposure is relatively high, decreasing in importance as the length of the exciting exposure increases. This is of special interest in view of the present trend toward shorter and shorter exposures of increasing intensity. Thus exposures of 0.1 second on D-type screens may produce persistence exposures of from 30 to 50 percent of the exciting exposure, whereas the same screens at exposures of 1.0 second produce persistence exposures of less than 20 percent of the original.

By reference to the curves of figure 6 and to the characteristic $D=\log E$ curve of the film, it is possible to predict the effect on the film of this persistence exposure. The solid curve in figure 7 shows the characteristic $D=\log E$ curve of a typical photofluorographic film. The curves in dashed lines show the densities produced on a film for exposures of 10 percent, 20 percent and 30 percent, respectively of the exposures for the solid curve. That is, if a given exposure produces a density of 2, an exposure 30 percent as great would produce a density of about 1.2 and an exposure 10 percent as great would produce a density of about 0.35 Thus, if the amount of persistence is known, the density produced by it can be read approximately from the appropriate curve directly below the corresponding exposure density on the solid curve. For example, suppose an exposure of 0.2 second using a screen of persistence shown by curve *C* in figure 6 produces a density of 1.5 on the film. From figure 6 it is found that this exposure results in a persistence exposure of 10 percent. From figure 7 it is found that 10 percent of an exposure producing a density of 1.5 results in a density of about 0.2. In this case, therefore, the persistence effects are negligible.

Whether persistence exposures are negligible, as in the above example, or much higher, they will produce objectionable effects only if the film is moved from position after exposure. Obviously, if the film remains in position after exposure, the only effect of persistence

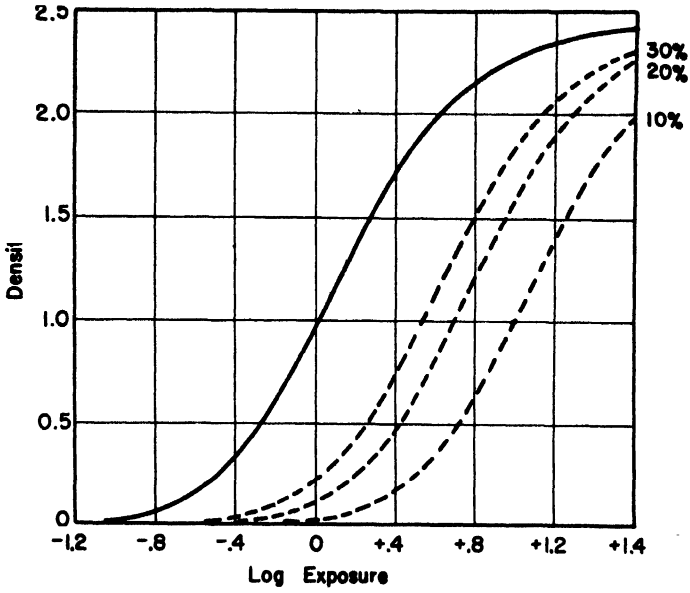

Figure 7

is to increase slightly the original exposure. It is after the film is moved or while it is in motion that fogging or afterimages can be produced. It is important, therefore, to see how the persistence exposure progresses with time.

It has already been pointed out that the decay of phosphorescence during the first few hundredths of a second is very rapid, and only persistence of low level remains for any length of time. This was clearly demonstrated by the fact that a delay of 0.02 second in opening the shutter in the apparatus used for measuring persistence exposure photographically, resulted in a loss of from 20 to 60 percent of the persistence exposure. That is, from 20 to 60 percent of the persistence exposure, depending on the intensity and rate of decay of persistence, is completed in something like 0.02 second.

Figure 8 shows the progress of the exposure due to persistence, expressed as the percent of the total persistence exposure which has occurred after a given length of time. Curve *D* is for screens of short persistence such as the B and E 2 type; curve *C* for 666D; and curve *B* for the D-type screens. Obviously, each type of persistence requires its own curve; however, the curves shown indicate the general order of magnitude of the effect.

Since it requires a definite time to move the film from position after exposure, these curves are important in considering the effect of persistence exposure on a film. In the case of short-persistence screens, curves *C* and *D*, over 30 percent of the persistence exposure has occurred at the end of 0.01 second and over 70 percent at the end of 0.1 second. Therefore, except in cases where high film speed is deliberately planned or required, as for example, in cine-roentgenography, it is almost impossible to move the film from position until it has received at least half of the total persistence exposure. If the total persistence exposure amounts to, say, 20 percent, only 10 percent exposure is left to produce harmful effects. Reference to figure 7 shows that this exposure is practically negligible. The same argument applies to the longer persistence type of screen, curve *B*, figure 8, provided the delay in moving the film is of the order of 0.1 second.

So far only the persistence due to single exposures on a rested screen has been considered. It is characteristic of many screens, especially those of longer persistence, that, if exposures are repeated rapidly after intervals too short to allow the screen to recover completely from phosphorescence, the persistence increases with each successive exposure until it reaches a value several times greater than for the first exposure of the series. The extent of this growth of persistence depends upon the exciting exposure and the rate of repetition. It is impossible to give here more than two examples of this effect, but they will serve to indicate the general nature of the phenomenon. In one case, the screens were given a series of exposures

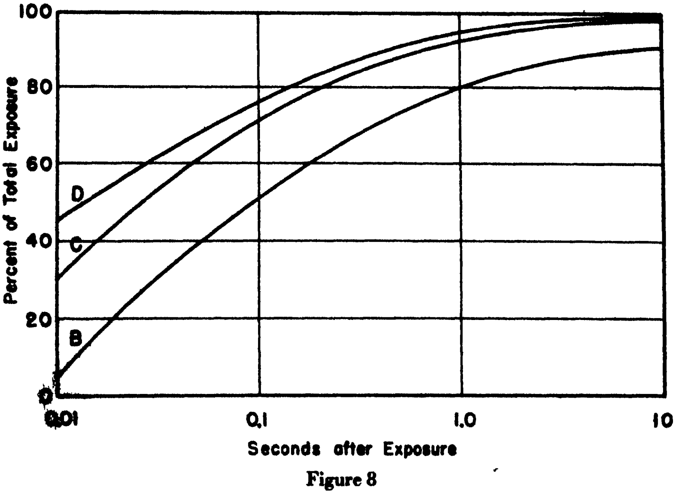

Figure 8

of 0.1 second at intervals of 5 seconds for 5 minutes. In the other case, the screens were given a series of exposures of 0.3 second at 20 second intervals for 1 hour. All exposures were made at 85 kilovolts, 100 milliamperes, at a target-screen distance of 40 inches and through a 10-centimeter presdwood phantom. The persistence after the last exposure of the series was then measured as described above. The resulting decay curves are shown in figure 9 Curve *A* shows the rate of decay after the first exposure, and curve *B* shows the rate of decay after the last exposure of the series. It will be noted that the increase in persistence is slight for the low-persistence screens B and E–2, somewhat greater for 666D and very much greater for the longer persistence D screens. Furthermore, the slope of the decay curve for the longer persistence screens indicates that low intensity phosphorescence may be expected to continue for some time; in many cases, hours. This is, of course, well known to those who have inadvertently exposed such screens to bright daylight.

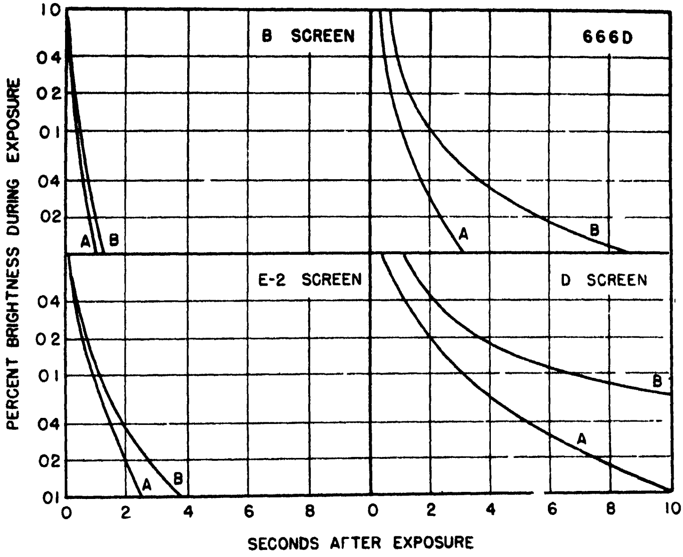

Figure 9

Figure 10 shows the exposures resulting from this persistence plotted against the elapsed time after the exposure. It will be observed that the short-persistence screens produce exposures of the same order as when rested and which are complete in a relatively short time, as indicated by the horizontal lines, curves *D* and *E*.

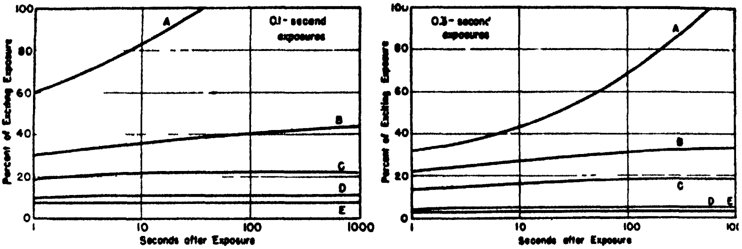

Figure 10

Screens of the 666D and short-persistence D-type, curves *C* and *B* respectively, show persistence exposures which are essentially complete in 1 second, while the persistence of the older type D-screen is so great that it continues to increase for many minutes. Thus the exposure due to persistence of such a screen may amount to 50 percent of the exciting exposure during the 20-second interval between exposures, but will produce an exposure of 100 percent or more of the original after the last exposure of the series or if the series is interrupted during its course. Reference to figure 7 again makes possible a prediction of the extent of objectionable effects to be expected from such persistence exposures.

Finally, limits of tolerance of persistence may be established from the curves of figure 7, and the choice of a screen for a particular application guided thereby. Two examples will suffice to show the reasoning. The limits chosen are for example only and may or may not represent practical cases. Suppose that the maximum density resulting from the primary exposure is 2.0 and that fogging due to persistence must be less than 0.5. Further, assume that only single isolated exposures of 0.3-second duration are required. From figure 7 it is seen that for a primary exposure density of 2.0 an exposure about 15 percent as great will result in a density of 0.5. Figure 6 shows that screens represented by curves *C*, *D*, and *E* produce persistence exposures less than 15 percent and would therefore be acceptable. However, the persistence shown by curve *B* is only slightly higher than 15 percent for this exposure and reference to figure 8 shows that 50 percent of this exposure has been completed in 0.1 second. Hence this screen also would be acceptable provided the film was not moved from position for about 0.1 second, actually less.

For the second example, suppose that a series of exposures of 0.3 second at the rate of 3 per minute is to be made with the same conditions of maximum density and fog density as above. Also assume that any exposure after the series is complete may be disregarded (by sacrificing the next frame if necessary). Reference to figure 7 again sets a limit of 15 percent on the persistence exposure. From figure 10 we see that for exposures stipulated, only screens of the type illustrated by curves *D* and *E* provide persistence below the level indicated, although the exposure resulting from the screen shown by curve *C* is only slightly above this value. If the film remains in position, say 0.1 second before being moved, this screen also should prove satisfactory.

Summary

Experimental methods for determining the rate of decay and total quantity of persistence of phosphorescent emission from fluoroscopic screens are described. Graphs showing the rate of decay of phosphorescence for several typical screens used in fluoroscopy and photofluorography and under various conditions of exposure are presented. The effects on a film of exposures resulting from persistence are discussed and the effect of repeated exposures on the persistence characteristics of screens is described. Factors influencing the limits of tolerance of persistence in screens are illustrated.

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Demonstration of Tubercle Bacilli in Sputum Smears

Selection of choice particles compared with various sodium hydroxide concentration techniques*

By George A. Spendlove, M. D., Martin Cummings, M. D., and Robert A. Patnode**

For purposes of differential diagnosis in tuberculosis, there can be no doubt that cultivation or animal inoculation of pathological materials are far more reliable than microscopic methods. There are situations, however, where the latter methods can be used profitably. for example, in following the course of a patient after original diagnosis by cultivation and/or animal inoculation; or in the mass screening of large numbers of patients where cultivation techniques are not readily available. In such situations, the question of the most efficient smear technique arises.

A few decades ago the preferred method of making sputum smears was to pour the specimen into a Petri dish on a black background and, with a platinum loop, to select bits of caseous debris or purulent material. This was done according to Koch's suggestion (*1*): "It will not do to take any chance streak of mucus from the sputum, which consists not only of secretion from the diseased parts of the lungs, but also of that from the bronchial tubes, saliva and mucus from the mouth and nose. We want to examine the secretion furnished by the diseased lung, and must therefore confine our attention to the ball-like yellowish masses, often to be found floating singly in the frothy viscous liquid, often however, forming the greater part of the sputum." Within recent years, this method has been abandoned by many laboratories in favor of one of the numerous concentration techniques

Petroff (*2*), Hanks (*3*), Cameron (*4*), Nagy (*5*), and many others have advocated a change from the direct smear to a portion of the treated sputum in which the bacilli have been concentrated. Theoretically such concentration of the bacilli seems practical; yet, in the case of small volumes of sputum and large volumes of digestants, concentration may not actually take place. Benzancon and Philibert (*6*) estimate the specific gravity of the tubercle bacillus to be between 1.010 and 1.080, which leaves little advantage in centrifugation for a digestant such as 4 percent NaOH with a specific gravity of about 1.040, or for 23 percent (10 percent anhydrous) trisodium phosphate which has a specific gravity of more than 1.060.

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*This study is based on duplicate examination of four series of sputum specimens numbering 500, 263, 244, and 716, respectively

**S A Surgeons and S A Sanitarian (R), respectively, from the Tuberculosis Section, Communicable Disease Center, Public Health Service, Atlanta, Ga , in cooperation with the Division of Tuberculosis, Washington, D. C , Assisting in the preparation of this report were Drs M Frobisher, Jr , Stuart Willis and Carroll Palmer

Centrifugation is not the only procedure of doubtful value. Steenken and Smith (*7*) state: "In preparing smears, routine decolorization with acid-alcohol containing 5 percent nitric acid may fail to detect bacilli that are only slightly acid-fast. In smears of material that has been previously digested with sodium hydroxide, the acid-fast property is prone to attenuation. This may be the explanation for the occasional case of a positive sputum or urine culture after negative smears."

Robinson and Stovall (*8*) say: "NaOH has the disadvantage of being injurious to the organisms if left too long in contact with them and may destroy their acid-fast character."

Using accepted sodium hydroxide digestion and concentration methods, Mishulow, Melman, and Romano (*9*) examined 369 specimens of sputum from 268 suspected and definite cases of tuberculosis. In each instance the result on examinations of direct smears prepared from *selected flecks* was as good as that prepared by concentration. These authors concluded: "It would therefore seem that by carefully selecting the material and thorough examination of the smears, more positive results may be obtained on routine examination without resorting to concentration of sputums."

To determine the relative efficiency of smears made by selection of choice particles and smears made by sodium hydroxide concentration, a comparison of the two methods under routine diagnostic conditions was undertaken.

Materials and Methods

Specimens were obtained from three sources, as follows:

1. *Lawson Veterans' Administration Hospital tuberculosis wards.* These specimens were usually freshly collected, and direct smears and sodium hydroxide concentrates were prepared on the same day.

2. *Georgia Department of Public Health.* These specimens were sent to the Health Department by practicing physicians throughout the State. After examination in the laboratories of the State Health Department, the remainders of the specimens were forwarded to the Tuberculosis Evaluation Laboratory. These were usually 2 to 3 days old when received.

3. *Battey Hospital, a State sanatorium in Rome, Ga.* Specimens were mailed to us from a distance of about 100 miles, and usually were 3 to 4 days old when prepared.

Two methods were employed in making the smears. In the first, the smears were prepared directly from the specimens by placing the sputum in a Petri dish on a black background, and selecting small bits of necrotic material, or cheesy, rusty, or bloody portions from various regions of the specimen. These choice particles were separated by means of sterile applicator sticks, placed on a slide, crushed and smeared by the rotary motion of another slide. With a minimum of experience, workers were able to detect and avoid food particles and various other artifacts unlikely to contain the bacilli. The smears thus prepared were thicker than the usual bacteriological smears, but care was taken to make them thin enough for complete decolorization during the staining process.

In the second method, which employed the concentration and sodium hydroxide digestion technique, 2–5 ml. of the specimen were transferred to a centrifuge tube and about 10 ml. of 4 percent NaOH were added. The tubes were shaken vigorously and then incubated at 37° C. for 20 minutes, during which time they were shaken once every 5 minutes. After centrifugation, the sediment was neutralized with 2 drops of 2N HCl (without indicator) and used for smear. The methods of digestion and concentration were those used by the State Serum Institute at Copenhagen as reported by Holm and Lester (*10*).

The smears of concentrated sputum, as well as the direct smears of selected flecks, were fixed on a warm plate at 75° C. for 30 minutes, then flamed and placed on a staining rack. The smears were covered with filter paper, then saturated with basic carbolfuchsin, and heated until the stain steamed gently. The slides were allowed to stand for 5 minutes, after which the filter papers were removed, the smears washed in water and decolorized about 2 minutes in acid alcohol (3 ml. conc. HCl to 95 ml. 95 percent alcohol). The slides were again washed in water, counterstained 15 to 30 seconds with Loeffler's alkaline methylene blue, rinsed with water and dried.

After examining a similar number of fields (approximately 10 minutes per slide) the results were summarized as negative and positive. In all, 500 specimens of sputum were examined. In the series of comparisons between direct smears and smears of concentrates, shown below, better results were consistently obtained by examining direct smears made of selected sputum flecks.

	Number	*Percent*
Positive direct smear—positive concentrate	107	21.4
Positive direct smear—negative concentrate	92	18.4
Negative direct smear—positive concentrate	8	1.6
Negative direct smear—negative concentrate	293	58.6
Total	500	100.0

Because of the great difference between the results obtained from examining smears made by the two methods, it was suspected that faulty technique (such as excessive dilution, prolonged exposure to NaOH, or improper neutralization), was responsible for the discrepancy. With this in view, a new series of 263 specimens was examined in which the concentration method was modified so as to achieve a more exact neutralization of the sediment.

The supernatant fluid was decanted after centrifugation, a small piece of sterile nitrazine paper was dropped in the tube and dilute hydrochloric acid added drop by drop until the paper indicated neutrality. One drop of this concentrate was placed on a slide, dried, and stained as previously described. Each specimen had one smear made of select flecks and one made of the digested sediment as described. Results of examination of 263 sputum specimens comparing direct smears with smears of the concentrates (exact neutralization) are given below.

	Number	*Percent*
Positive direct smear—positive concentrate	72	27. 4
Positive direct smear—negative concentrate	13	5. 0
Negative direct smear—positive concentrate	0	0 0
Negative direct smear—negative concentrate	178	67. 6
Total	263	100 0

The results of this study show a much closer correlation of positives for direct smear and positives for concentrated smears. Presumably, improved results in the case of the concentrated smears were due to the more careful neutralization, which suggests a possible relationship between exposure to sodium hydroxide and acid-fastness as mentioned by Steeken and Smith (*7*) and Robinson and Stovall (*8*) previously quoted.

In view of the better results of more exact neutralization of concentrates, other methods of improving the concentration technique were attempted. Instead of using only 2 ml of sputum to 10 ml. of NaOH, the proportions were changed to equal parts of specimen and NaOH, and the specimens were shaken in a paint-conditioning machine (*11*) for 10 minutes at room temperature (instead of 20 minutes at 37° C). A total of 244 specimens were digested for 10 minutes by equal volumes of 4 percent sodium hydroxide, concentrated by centrifugation at 3,000 r. p. m. for 15 minutes, decanted and the sediment neutralized as previously described, using sterile nitrazine paper as an indicator.

As with the previous series, two smears were made from each specimen, one directly from selected flecks and one from the concentrated sediment. Results of examination of 244 sputum specimens comparing direct smears with smears of the concentrates (equal parts sputum and digestant) follow:

	Number	*Percent*
Positive direct smear—positive concentrate	58	23. 7
Positive direct smear—negative concentrate	19	7. 7
Negative direct smear—positive concentrate	3	1. 2
Negative direct smear—negative concentrate	164	67. 4
Total	244	100 0

In this study, concentration yielded fewer positives than direct smears. The data par se are of doubtful significance in such a small series, but the cumulative value of the several experiments is considerable.

A test of the effectiveness of the macroscopic selection method was made after one further attempt to improve the concentration technique. To avoid the possibility of washing the concentrated smears off the slides, a fixative agent was used. Equal parts of egg albumin and glycerine were mixed, filtered through gauze, and applied by touching the surface of the slide with an applicator stick wet with the fixative. This very small drop of reagent was smeared evenly over the surface and allowed to dry. After heat fixation of the specimen, the slides were stained in the usual manner, altering the previous procedures only by allowing the slide to cool for 5 minutes in a refrigerator before decolorizing and destaining without first washing in water as suggested by Stempa (*12*).

A total of 716 sputa were so treated, making 2 smears of each as previously described. Results of examination of the 716 sputum specimens comparing direct smears with smears of the concentrates (fixative, slide cooled, no washing) follow:

	Number	*Percent*
Positive direct smear—positive concentrate	204	28 5
Positive direct smear—negative concentrate	36	5 0
Negative direct smear—positive concentrate	8	1 1
Negative direct smear—negative concentrate	468	65 4
Total	716	100 0

Discussion

In the last series of experiments, the described changes in techniques yielded a significantly greater number of positive results from concentrates than were obtained without such changes. This improvement was attributed to several factors, including the use of relatively larger volumes of specimen, shorter exposure to digestant, more exact neutralization, the use of a smear fixative, and more attention to staining procedures (cooling the slides before decolorizing and using care to prevent dislodgement of the bacilli during washing or staining). These results indicate, too, the necessity for more reliable techniques than are usually used in the preparation of smears by sodium hydroxide concentration methods. It is clear, however, that even with the improvements in concentration technique, the direct smear method, properly used, consistently yields superior results.

It should be noted that all experiments were performed by the same bacteriologists, so that any change due to personal experience was eliminated. Often, a second team of workers reviewed these smears and similar results were obtained.

An impartial evaluation of the procedures used was made during the work of a training class (*13*) when 7 different workers, trained in as many different dependable laboratories, independently prepared direct and concentrated smears from 121 sputum specimens. Using the techniques described for the third series of comparisons described above, these bacteriologists obtained, on the average, 47.1 percent positives by the macroscopic selection of material for smears, as compared to 40.5 percent for concentrated smears.

It would appear, therefore, that under the conditions described, the simpler technique—direct smears of carefully selected material—is superior as a routine procedure to smears made from NaOH concentrates.

References have already been made to articles written by Robinson and Stovall (*8*), and Steenken and Smith (*7*), wherein the authors mention the possible disappearance of the acid-fast properties of the tubercle bacilli when subjected to sodium hydroxide digestion. It is possible that this accounts for much of the differences in results between the methods studied. This would appear to be borne out by the fact that most of the improvement came with shorter exposure to sodium hydroxide and more careful neutralization.

There is a probability that differences in specific gravity between the bacilli and sodium hydroxide mixtures are not sufficient to insure concentration on centrifugation. Hanks, Clark, and Feldman (*3*) wrote of finding tubercle bacilli in the supernatants discarded during the routine examination of specimens digested and centrifuged in the usual manner. On occasions these authors even found more bacilli in the flocculation concentrate of the supernatant than were found in the original sodium hydroxide concentrate.

Whitehead (*14*), using Hanks' method, examined 3,046 specimens and concluded that: "Concentration, centrifugalization and smears of the sediment did not seem to increase the number of organisms seen in the smears."

In our opinion, the inferiority of NaOH concentration methods could probably be attributed to: (a) the loss of bacilli during centrifugation as suggested by Hanks, and (b) loss of acid-fastness, as suggested by Steenken.

The chief use of concentration methods is to supplement the direct smear when a specimen is negative by the latter examination. A study of the last table reveals this to be true, but only in a small number of cases. It is therefore suggested that if one goes to the trouble of concentrating the specimen it should be planted on culture media where small numbers of tubercle bacilli may be more readily detected.

It is by no means suggested that direct smears made by the selection technique are as reliable as cultivation methods of isolating tubercle bacilli from pathological material. One must remember that many thousands of tubercle bacilli must be present in pathological material before the microscopist has a reasonable chance of finding them. It must also be stressed that one cannot reliably differentiate between pathogenic and nonpathogenic acid-fast bacilli microscopically.

Where the choice of method is limited, however, to microscopic examination, it is of value to make smears of choice particles of pathological material and to learn to select those particles which, from the pathologist's viewpoint, are most apt to contain the tubercle bacilli which are present in a given specimen.

Summary and Conclusions

1. Four series of sputa, consisting of 500, 263, 244, and 716 specimens, have been studied.
2. Smears made of selected particles gave more positive results in each series than smears made following concentration of the same specimens by the various methods of sodium hydroxide digestion used.
3. Sodium hydroxide digestion and concentration techniques are quite exacting in their requirements.
4. Macroscopic selection is dependable and probably superior to sodium hydroxide digestion and concentration by the methods described.

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Characteristics of Commercial X-ray Screens and Films—V

By WILLARD W. VAN ALLEN, B. Sc *

As reported in a previous issue [1] the Electronics Laboratory is engaged in the evaluation of characteristics of commercial X-ray films, screens, and developers in appropriate combinations. The results of this work are summarized in these pages from time to time in tables giving the speed of screen-film-developer combinations, the contrast (gamma) of the films in different developers, and the fog developed by the films in these developers These tables are cumulative and include the results of previous determinations, corrected and revised where necessary.

TABLE 1.—*Speed of fluoroscopic screen-film-developer combinations* [1]

Screens	Film and developer [2]							
	Ansco Fluorapid film		DuPont Fluorofilm		Eastman Blue Photoflure		Eastman Green Photoflure	
	Eastman X-ray	Ansco Liquadol	Eastman X-ray	Ansco Liquadol	Eastman X-ray	Ansco Liquadol	Eastman X-ray	Ansco Liquadol
D sample 1	120	105	95	90	95	85		
D sample 2	150	125	115	110	115	105		
D sample 3	155	140	130	120	130	115		
666D sample 1	100	75	80	65	75	65		
666D sample 2	125	100	100	85	100	85		
B sample 1							60	55
B sample 2							70	55
B-2							95	85
E-2							140	120

[1] Speeds determined with film and screen in direct contact and therefore do not represent the speed of the same combinations when used in a photofluorograph Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table These will include G E Supermix, Eastman Liquid X-ray, Eastman Rapid X-ray, and Buck X-ray

[2] Development time (as recommended by manufacturer of developer) Eastman X-ray Developer (dry ingredients) 8 minutes at 68° F , Ansco Liquadol, 4 minutes at 68° F

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[1] Pub Health Rep. **64**: 420 (1949)

TABLE 2.—*Speed of intensifying screen-film-developer combinations* [1]

	Film and developer [2]				
	Ansco High-speed film [3]	DuPont No 508 film		Eastman Blue Brand film	
	Ansco Liquadol	Eastman X-ray	Ansco Liquadol	Eastman X-ray	Ansco Liquadol
Buck					
Xtra speed	70	55	50	85	90
Midspeed	60	50	45	70	75
Definition	50	40	40	60	65
Eastman					
Ultra speed	110	90	85	140	145
Fine grain	85	70	65	110	110
Definition	60	50	45	80	75
Patterson					
High speed	115	80	85	120	130
Parspeed	60	55	50	90	80
Detail	20	20	15	25	25

[1] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table These will include G E Supermix, Eastman Liquid X-ray, Eastman Rapid X ray and Buck X-ray

[2] Development time (as recommended by manufacturer of developer) Eastman X-ray Developer (dry ingredients) 4½ minutes at 68° F, Ansco Liquadol, 3 minutes at 68° F

[3] Test with Eastman X-ray Developer to be reported in a subsequent issue

TABLE 3.—*Average values of fog and contrast (gamma)*[1]

Film	Fog densities Developer [2]		Contrast (gamma) - Developer [2]	
	Eastman X ray	Ansco Liquadol	Eastman X-ray	Ansco Liquadol
Photofluorographic				
Ansco Fluorapid	0 19	0 09	2 1	1 8
DuPont Fluorofilm	21	15	1 9	2 0
Eastman Blue Photoflure	07	04	1 8	1 8
Eastman Green Photoflure	17	11	2 0	2 1
Roentgenographic				
Ansco High speed		10		2 8
DuPont No 508		20	2 6	2 7
Eastman Blue Brand		08	2 8	3 0

[1] Values obtained with open tank development and continuous mechanical agitation at 68° F

[2] Development time as given in tables 1 and 2 Subsequent reports will present similar data for additional developers used in combination with the films shown above These will include G E Supermix, Eastman Liquid X-ray, Eastman Rapid X ray, and Buck X-ray

Correction

The article "Tuberculosis Mortality in the United States, 1947," Public Health Reports, vol. 64, No. 13, April 1, 1949, contained the following errors:

Page 413, table 5, under headings Percentage Change: Male: 1939–41 to 1947, – 49 9 should be –49 4.

Page 418, table 7, under headings, Percentage change in rate, 1946 to 1947: Idaho, –5.5 should be + 5 5

Page 421, table 9, under headings, Type of service: Tuberculosis hospitals: Wisconsin, 32 should be 323.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 16, 1949

Except for very slight increases in the East North Central and Mountain Areas, the reported incidence of measles declined during the week in all of the nine geographic divisions. A total of 27,750 cases was reported, as compared with 32,909 last week and a 5-year (1944-48) median of 25,616. Of the 19 States reporting more than 500 cases, only 6, with reports as follows (last week's figures in parentheses), showed increases: Massachusetts 1,023 (1,001), Ohio 976 (678), Georgia 655 (575), Oklahoma 537 (445), Texas 3,013 (2,799), Washington 565 (475). The total for the year to date is 343,715 cases, as compared with a 5-year median of 250,733, reported for the corresponding period last year.

The total of 2,606 cases of influenza reported, as compared with 2,658 last week and a 5-year median of 1,917, is the largest reported for a corresponding week of the past 5 years except that of 23,536 for the same week in 1947. Only 4 States as follows, reported currently more than 101 cases (last week's figures in parentheses): Virginia 242 (249), South Carolina 304 (471), Alabama 386 (170), Texas 1,009 (1,120). The total to date is 61,035, as compared with a 5-year median of 179,321 and 324,632 reported for the period in 1944.

Of 45 cases of poliomyelitis reported (last week 41, 5-year median 31), 12 occurred in Texas (last week 5), 4 in New Jersey, and 3 in California. No other State reported more than 2 cases. The total reported for the past 4 weeks, since the average week of seasonal low incidence, is 180, as compared with a 5-year median of 109.

During the week, 3 cases of anthrax were reported, 2 in Pennsylvania and 1 in New York; 3 cases of Rocky Mountain spotted fever, 1 each in North Carolina, South Carolina, and Montana; and 2 cases of smallpox, 1 in Kansas and 1 in Mississippi.

A total of 9,232 deaths was recorded during the week in 94 large cities in the United States, as compared with 9,495 last week, 9,009 and 9,751, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946-48) median of 9,127. The total for the year to date is 147,369, as compared with 151,611 for the corresponding period last year. Infant deaths during the week totaled 608, last week 611, 3-year median 659. The cumulative figure is 9,915 as compared with 10,417, for the corresponding period last year.

Telegraphic case reports from State health officers for week ended April 16, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt. spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1		101	396		29			14			1	2	
New Hampshire			4	63					1				6	
Vermont				278					4				13	
Massachusetts	8	1		1 023	1		1		190			1	58	
Rhode Island				129		10			9				3	
Connecticut	5		1	1 250	3	50			30				6	
MIDDLE ATLANTIC														
New York	5		[b] 2	2 475	11	320	1		187			2	75	7
New Jersey	6		3	1 586		59	4		120			2	49	1
Pennsylvania	15	2	(b)	2 056	3				263			1	73	
EAST NORTH CENTRAL														
Ohio	2		1	976	5	50			324			2	47	19
Indiana	4		6	203		8			61			1	10	24
Illinois			31	152	4	104	1		116		2		42	2
Michigan [c]	2		3	613	3	20	2		396			1	24	2
Wisconsin			33	1 964	2	13	1		61				35	
WEST NORTH CENTRAL														
Minnesota	5			75	2	5	1		29		1	1		
Iowa	2			74		6	2		9				1	7
Missouri	2		5	279	2	19	2		24		2		3	
North Dakota				10					3		2		5	
South Dakota				72					1	(1)				-
Nebraska			9	93					4					-
Kansas				999	2	20			17	1			11	
SOUTH ATLANTIC														
Delaware	1			31			1		12					
Maryland [c]	2		3	555	2	46			[e] 35				6	
District of Columbia	1			146	1	7			7				4	
Virginia	1		242	[illegible]	2	51			17			2	11	4
West Virginia	3		13	110	1	6			9				14	
North Carolina	3			851	3			1	19		3	1	26	
South Carolina	1	1	304	336		122		1	4				22	1
Georgia	2		24	655	1	40	1		6		3		2	13
Florida	6		10	105	1	19	2		3			1	1	2

EAST SOUTH CENTRAL														
Kentucky	3		4	148	2	1	1		28				7	12
Tennessee	3		89	472	3	74	1		20			1	15	
Alabama	3		386	592	1	66			7			1	3	11
Mississippi [a]	4		15	166	1	35	1		9	1	2	2	5	
WEST SOUTH CENTRAL														
Arkansas	3		87	615		65			4		6	2	12	3
Louisiana	1		27	140	6	64	1		3		3	5	1	
Oklahoma		3	34	537	1	33			5				5	3
Texas	20		1,009	3,013	11	306	12		22			9	105	24
MOUNTAIN														
Montana				49	1			1	9				1	
Idaho	1		5	163		3	1		[c] 18				1	
Wyoming				27		7	1		3					
Colorado	1		26	396		18			13			1	2	
New Mexico				138		11			6			1	4	
Arizona			101	206		8			4				3	
Utah [a]				73		6	1		9				10	
Nevada				22			1							
PACIFIC														
Washington	1			565	4		1		21				12	
Oregon			1	266	1	26	2		17			2	12	
California	10		27	1,598	9	36	3		[c] 101			2	37	2
Total	127	7	2,606	27,750	89	1,761	45	3	2,263	2	24	42	775	
Median, 1944-48	230	7	1,917	25,616	131		31	2	3,971	10	12	53	2,149	
Year to date 15 weeks	2,495	116	61,035	343,715	1,286	35,635	1,102	18	42,015	[1] 27	398	630	14,971	
Median, 1944-48	4,231	119	179,321	250,733	2,837		521	10	52,463	149	267	689	32,906	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	7,609		97,305	396,108	2,130		180		64,713	[1] 42		170	25,004	
Median, 1944-48	11,797		299,112	285,679	4,341		109		91,034	225		210	58,674	

---

[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, respectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever, reported separately, as follows: New York 1; New Jersey 2; Virginia 2; Louisiana 1; Texas 1; Colorado 1; Oregon 1; California 2; salmonella infections, not included, were reported as follows: New York 1.

[1] Deduction: Smallpox, South Dakota, week ended Mar. 26, 1 case.

Anthrax: New York 1; Pennsylvania 2.

Alaska: Influenza 1; measles 2; streptococcal sore throat 2.

Territory of Hawaii: Diphtheria 1; influenza 6; measles 152; poliomyelitis 1.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended March 26, 1949.—During the week ended March 26, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		4	5	296	525	22	17	42	257	1,168
Diphtheria				16	2			3		21
Dysentery										
Amebic								3		3
Bacillary					1				1	2
German measles		1		305	48		170	13	7	544
Influenza		115			131	3	20		1	270
Measles		131	42	320	237	222	126	262	158	1 498
Meningitis, meningococcal				2	1					3
Mumps		9	5	241	250	51	39	19	65	679
Poliomyelitis				1						1
Scarlet fever		5	3	133	110	3	1	21	20	296
Tuberculosis (all forms)		4	2	100	36	18	11		29	200
Typhoid and paratyphoid fever				11					2	13
Undulant fever					1	1		2		4
Venereal diseases										
Gonorrhea	1	4	9	92	52	31	15	29	57	290
Syphilis		7	5	106	33	11	2	8	16	188
Other forms									1	1
Whooping cough				126	22	8	3			159

JAMAICA

Notifiable diseases—4 weeks ended March 26, 1949—For the 4 weeks ended March 26, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	localities
Chickenpox	17	47	Scarlet fever		
Diphtheria		1	Tuberculosis (pulmonary)		47
Dysentery, unspecified	1	3	Typhoid fever		47
Erysipelas	1		Typhus fever (murine)		1
Leprosy		4			

NEW ZEALAND

Gilbert Islands—Butaritari (Makin)—Influenza.—An epidemic of influenza was reported on the atoll of Butaritari (Makin) in the Gilbert Islands, New Zealand, in the month of January 1949. During the [illegible] 784 cases are stated to have occurred there.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—During the week ended April 2, 1949, 215 cases of cholera with 61 deaths were reported in Calcutta, India.

Plague

India.—During the week ended April 2, 1949, plague was reported in cities in India as follows: Cawnpore 36 cases, 8 deaths; Calcutta 12 cases, 1 death.

Smallpox

Great Britain England—London.—Information dated April 7, 1949, state that 1 fatal case of smallpox occured in an isolation hospital in London during the first 10 days of April 1949. This fatality was the wife of a man who died on the steamship "Mooltan" before its arrival at the Port of London on April 4, apparently of smallpox. It was assumed that the disease was contracted in Bombay. According to information dated April 13, 1949, 5 confirmed cases of smallpox, 4 of them fatal, have been reported in England since the death of the above patient. Two suspected cases which have been under observation in isolation are considered to be almost certainly smallpox, while 3 other suspected cases, also under observation, are believed to be only chickenpox. These are the first cases of smallpox reported in England since the outbreak in the first half of the year 1947.

India. During the week ended April 9, 1949, smallpox was reported in cities in India as follows: Bombay 158 cases, 43 deaths, Madras 36 cases, 5 deaths, New Delhi 21 cases, 4 deaths.

Java- Batavia. In the current outbreak of smallpox in Batavia, Java, 1,425 cases with 108 deaths had been reported in the city up to March 16, 1949, 153 cases with 16 deaths within a 30-mile radius, and 1,022 cases with 100 deaths to the west of Batavia in Bantam District. During the period March 6-April 9, 1,260 cases were reported in the city.

Typhus Fever

Chile—Santiago.—During the period March 20–April 2, 1949, 21 cases of typhus fever were reported in Santiago, Chile.

Ethiopia.—Delayed report: During the period October 19–November 1, 1948, 27 cases of typhus fever were reported in Ethiopia.

Transjordan.—During the week ended April 2, 1949, 17 cases of typhus fever were reported in Transjordan.

Yellow Fever

No reports of yellow fever were received during the current week.

DEATHS DURING WEEK ENDED APR. 9, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Apr. 9, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9, 496	9, 749
Median for 3 prior years	9, 749	
Total deaths, first 14 weeks of year	138, 137	142, 602
Deaths under 1 year of age	611	719
Median for 3 prior years	714	
Deaths under 1 year of age, first 14 weeks of year	9, 307	9, 758
Data from industrial insurance companies:		
Policies in force	70, 476, 744	71, 084, 296
Number of death claims	13, 506	15, 613
Death claims per 1,000 policies in force, annual rate.	10. 0	11. 5
Death claims per 1,000 policies, first 14 weeks of year, annual rate	9. 8	10. 6

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Public Health Reports

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Public Health Reports

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Pertussis and Aureomycin

By Joseph A. Bell, M. D., Margaret Pittman, Ph. D., and Byron J. Olson, M. D.*

Pertussis is a universally prevalent disease which has been resistant to all methods of treatment that appear suitable for general use in the home. Aureomycin is a relatively nontoxic antibiotic which can be administered orally. It is a yellow crystalline substance obtained from the mold *Streptomyces aureofaciens* described by Duggar (*1*). Harned et al (*2*) have described the pharmacology of aureomycin. Others (*3*) have described *in vitro, in vivo,* and clinical trials of aureomycin in a variety of specific infections, but not in pertussis. Since pertussis has been a major concern of two of the authors for many years, such studies were undertaken at the National Institutes of Health in December 1948.

The main objective of these studies was to determine whether aureomycin is of value in the treatment of experimental infection of mice with *Hemophilus pertussis* and, if of value, to initiate a clinical trial. The laboratory experiments were to determine whether aureomycin would protect mice against the effects of intracerebral infection induced with *H. pertussis*, and, if so, to obtain a general idea of the optimum treatment regime. Mice do not naturally acquire pertussis, and the results of aureomycin treatment of mice following a highly artificial intracerebral infection can only serve as a general guide for studies in the treatment of the respiratory infection in humans. The early favorable results of the laboratory experiments justified a clinical trial which was promptly undertaken. To date, 20 human cases have been treated in their homes with aureomycin, and the apparent beneficial effect prompts the inclusion of preliminary clinical findings in this report.

Laboratory Methods and Procedures

Equal numbers of male and female white mice from a closely inbred strain, weighing 15 to 18 gm., were distributed in groups of 10. They were infected by intracerebral inoculation of 0.03 ml. of a sus pension of an 18- to 24-hour culture of *H. pertussis*, strain No. 7 (Kendrick 18323), in a solution of casein peptone. The technique of infection and the titration of the culture were the same as employed by the National Institutes of Health in the evaluation of antigenicity of pertussis vaccines (*4*). After infection the mice were observed daily, and usually at more frequent intervals, for 28 or 35 days. Cultures were made from the brains of all the mice, including those dying during the observation period and those killed at the termination of the experiment. The results were recorded as positive or negative depending upon whether *H. pertussis* was present or absent, and as unknown if there was overgrowth by other bacteria. Bordet-Gengou medium containing 17-percent rabbit blood was used for all cultural work.

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*Senior surgeon, senior bacteriologist and senior surgeon, respectively, Microbiological Institute, National Institutes of Health, Bethesda, Md.

Five laboratory experiments were made, and in each there was included a titration of the culture in 30 or more normal mice in order to calculate the LD_{50} of the controls. The mice treated with aureomycin received infecting doses varying from 2,000 to 200,000 organisms representing an LD_{50} from 1 to 700. For treatment, the aureomycin hydrochloride[1] was dissolved in neutral phosphate buffer immediately prior to use. It was injected subcutaneously in 0.25-ml. amounts when the single dose was 2.5 mg. or less, and in 0.5- or 1.0-ml. amounts when the single dose was 5 or 10 mg., respectively. The total amount of treatment was varied from 0.078 to 32.0 mg. of aureomycin. The interval between injection of the culture and beginning of treatment was varied from 6 to 96 hours. The frequency of treatment was varied from one to four times a day at equal time intervals, and the duration of treatment was varied from a single dose to 8 days of treatment.

All of these numerous variables were considered essential to obtain a general idea of the optimum treatment regime. In various combinations they represent hundreds of treatment regimes, the detailed analysis of which goes far beyond the stated objectives of the laboratory experiments. Since the mice were uniformly treated in groups of 10, it is permissible to combine these groups in logical order whenever the difference in the protection resulting from treatment in each of the small groups was not significant. Such combinations simplify the presentation of results. An example of the method used in combining these small groups is included.

Results

In the pilot experiment, 30 mice were inoculated intracerebrally with 2,000 organisms which represented approximately 3 LD_{50} (determined by titration of the culture in 30 additional mice). Twenty mice were treated with a total of 10 mg. of aureomycin divided into 10 doses given at 12-hour intervals beginning 6 hours after infection; the other 10 remained untreated. Only 1 of the 20 treated mice died (this occurred on the 17th day), while 7 of the 10 untreated mice died within 2 weeks. Of the 19 treated survivors, 9 were killed on the 21st day and the remaining 10 were killed on the 28th day together with the 3 untreated mice. The brain cultures of the 22 survivors were negative.

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[1] Contributed by Lederle Laboratories Division, American Cyanamid Co., through courtesy of Dr. B. W. Carey, director.

In the second experiment, 150 mice were used. The mice were inoculated intracerebrally in groups of 50 with 2,000, 20,000, and 200,000 organisms which represented approximately 1, 10, and 100 LD_{50}, respectively. As in experiment 1, treatment was started 6 hours after infection and a total of 10 mg. of aureomycin was given each mouse, either in a single dose or divided into 2, 5, or 10 doses. Only 17 of the 120 treated mice died, while 21 of the 30 controls which received corresponding doses of the culture died. The average time of death in the treated mice was 20 days and in the controls 8.7 days after infection. All surviving mice were killed on the 35th day and their brain cultures were negative, except that of 1 control which was positive.

In the third experiment, the mice were inoculated intracerebrally with 100,000 organisms which represented approximately 200 LD_{50}. The virulence of the culture used in this experiment had been increased by one mouse brain passage. The treated mice were given a single dose of aureomycin, but the amount and the interval between infection and treatment was varied. The results are summarized in table 1. No protection was evident when the single treatment dose was given 72 or 96 hours after infection. It is noteworthy that these mice were all obviously ill and many were paralyzed at time of treatment. Mice receiving a single small dose of 0.313 mg. or less showed no evidence of protection except possibly a slight delay in time of death. On the other hand, mice given a single dose 24 or 48 hours after infection showed a definite delay in time of death; those treated at 48 hours also showed a substantial proportion of survivors.

The essential findings of experiment 4 are given in table 2. The infecting dose was again 100,000 organisms from the same culture used in experiment 3. The infecting dose represented approximately 700 LD_{50}. Varying amounts of aureomycin were given in 1 to 8 doses beginning 24, 48, or 72 hours after infection. Table 2 shows again that treatment begun 72 hours after infection (group *b*) gave no evidence of protection. The smaller doses of the drug given 24 hours after infection (group *c*) gave a definite delay in time of death. Mice given a total of 5 or 10 mg. of aureomycin in divided doses starting 24 or 48 hours after infection (groups *d* and *e*) showed not only a delay in time of death but also a substantial proportion of survivors. Mice

Table 1. *Experiment 3—Mortality and cultural results in mice treated with a single dose of aureomycin*

[Infection dose = 100,000 organisms equivalent to 200 LD_{50}]

Group	Interval between infection and treatment in hours	Total amount drug in mg.	Total number of mice	Number of mice dying during observation period								Number of mice surviving				*H pertussis* culture total	
				Total	Week of death				Culture			Total	Culture				
					1	2	3	4	+	−	Unk		+	−	Unk	+	−
a	0	0	20	20	19	1			14	0	6	0	-	-	0	14	0
b	72, 96	10-0 625	70	67	59	7	1	0	52	2	13	3	0	3	0	52	5
c	24, 48, 72	0.3-0 08	60	57	39	17	1	0	48	0	9	3	1	2	0	49	2
d	24	10-1 25	37	34	0	20	14	0	28	0	6	3	0	2	1	28	2
e	48	10-1 25	40	19	3	5	7	4	15	2	2	21	0	21	0	15	23
PERCENTAGES																	
a, b, c[1]	-	-	100	96	78	17	1	0	76	1	19	4	1	3	0	77	5
d	24 hours		100	92	0	54	38	0	76	0	16	8	0	5	3	76	5
e	48 hours	-	100	48	8	13	18	10	38	5	5	52	0	52	0	38	58

[1] Untreated, late treatment, small doses

EXAMPLE OF GROUP COMBINATIONS

The following basic data are presented to exemplify the method of combining various groups of 10 mice into larger groups for summary in tables 1 and 2. The mice below from experiment 3 (table 1) received only one dose of aureomycin 48 hours after infection.

Aureomycin mg /mouse	Number of mice	Day of death following infection									
None (controls)	10	5	5	5	5	5	6	6	6	6	10
0 078	10	5	6	6	6	7	7	7	7	7	8
0 313	10	7	7	8	8	9	9	9	11	S	S
1 25	10	11	12	12	13	20	S	S	S	S	S
2 50	10	15	16	[1] 18	25	S	S	S	S	S	S
5 0	10	13	16	16	16	S	S	S	S	S	S
10 0	10	4	7	7	22	23	[1] 28	S	S	S	S

[1] These and all survivors (S) had negative brain cultures for *H pertussis*

It is apparent that there was no important difference in protection between the four groups of mice receiving a single dose of aureomycin ranging from 1.25 to 10.0 mg. Forty mice receiving these doses are tabulated as group *e* in table 1. The group of mice receiving 0 313 mg showed the same pattern of death as the group receiving 0.078 mg., and this pattern was like that of other groups treated with the same dosages 24 or 72 hours after infection. These mice are included in group *c* in table 1.

receiving 4 doses of drug beginning 48 hours after infection fared as well as and perhaps better, in view of cultural results, than those receiving 8 doses of the same total amount (either 5.0 or 10.0 mg.) starting 24 hours after infection.

In the fifth experiment the infecting dose was 20,000 bacteria, representing approximately 200 LD_{50}. Treatment was begun 6 or 48 hours after infection, and 2.0, 0.5, or 0.125 mg. of aureomycin was given

Table 2. *Experiment 4—Mortality and cultural results in mice treated with various doses of aureomycin*

[Infection dose = 100,000 organisms equivalent to 700 LD_{50}]

Group	Interval between infection and treatment in hours	Number of doses[1]	Total amount drug in mg	Total number of mice	Number of mice dying during observation period								Number of mice surviving				*H. pertussis* culture total	
					Total	Week of death				Culture			Total	Culture				
						1	2	3	4	+	−	Unk		+	−	Unk	+	−
a	0	0	0	30	30	27	3			30	0	0	0				30	0
b	72	1-8	20-2 5	70	70	62	6	2		67	1	2	0				67	1
c	24	8	2 5, 1, 0 5	29	25	0	23	0	2	24	1	0	4	2	2	0	26	3
d	24	8	10, 5	20	9	0	5	3	1	9	0	0	11	1	10	0	10	10
e	48	4	10, 5	20	9	2	1	2	4	4	2	3	11	0	11	0	4	13

PERCENTAGES

Group				Total number of mice	Total	1	2	3	4	+	−	Unk	Total	+	−	Unk	+	−
a, b (Untreated and late treatment)				100	100	89	9	2		97	1	2	0				97	1
c (Small doses)				100	86	0	79	0	7	83	3	0	14	7	7	0	90	10
d, e (Moderate doses)				100	45	5	15	12	12	32	5	8	55	2	52	0	35	58

[1] Interval between doses = 12 hours

per dose with 6-, 12-, or 24-hour intervals between doses for periods of 2, 4, or 8 days. In this, as in previous experiments, positive cultures were obtained almost uniformly from mice dying during the observation period, particularly from those dying during the first 3 weeks, and negative cultures were the rule from mice surviving 28 days. The groups of mice having low mortality had a delayed time of death as compared with those having high mortality. Thus, table 3 shows only the number of mice surviving 28 days in each separate group of 10 treated mice. These groups are arranged according to the combinations of treatment variables, and the total amount of treatment given each group is indicated at the bottom of the table by dotted connecting lines. By inspection it is seen that the findings of previous experiments were confirmed. It is obvious that treatment for 8 days gave better protection than treatment for 4 or 2 days, and that treatment with the larger doses gave complete protection, whereas the smaller doses did not, except when treatment was begun 48 hours after infection.

In experiment 5 the amount of aureomycin per dose that would protect 50 percent of the mice on the different treatment schedules was calculated by the Wilson-Worcester method (*5*). Table 4 shows the results of these computations. It shows that decreasing dosages were required to protect 50 percent of the mice either as the duration of treatment was prolonged or as the number of doses per day was increased. It is possible that this result may be due in whole or in part to the total dosage given. To investigate this, groups of mice receiving the same total dose were paired when the two groups differed

Table 3. *Experiment 5—Number of mice surviving 28 days in each group of 10 mice treated as specified*

[Infection dose=20,000 organisms equivalent to 200 LD_{50}]

Interval infection to treatment (hours)	Duration of treatment (days)	Milligrams of aureomycin per dose									
		2.0			0.5			0.125			0.063
		Doses/Day			Doses/Day			Doses/Day			Doses/Day
		4	2	1	4	2	1	4	2	1	4
48	8				10	7	4	8			9
6	8	*6	10	10	9	8	1	7	4	3	
6	4	*8	10	2	4	0	1	2	0	0	
6	2	9	5	0	1	0	0	1	0	0	
Total No. Mg.		16+	8	4		2	1		0.5	0.25	

*4 and 2 mice in these 2 groups died on third to fifth day apparently from toxicity of drug as the cultures were negative. Treatment of these 2 groups was discontinued on the fourth day.

Table 1. *Experiment 5—The calculated number of milligrams of aureomycin required per dose to protect 50 percent of the mice*

Duration[1] of treatment (days)	Number of doses per day		
	4 (q 6 hr.)	2 (q 12 hr.)	1 (q 24 hr.)
8	0.057 (0.023–0.142)[2]	0.17 (0.12–0.24)	0.58 (0.41–0.83)
4	0.43 (0.32–0.58)	0.54 (0.42–0.68)	>2.0
2	0.88 (0.67–1.17)	2.0 (1.5–2.7)	No protection.

[1] Treatment began 6 hours after infection.

[2] The figures in parentheses represent the limits of one standard deviation expressed in number of mg.

only as to whether they received treatment once or a total of two or four times a day. In six of seven such pairs there were more survivors in the groups receiving treatment two or four times a day than in those treated once a day, but in no one pair was the difference significant. In total, however, there were only 18 survivors out of 70 mice receiving one treatment a day, whereas there were 32 survivors among the 70 mice receiving multiple doses per day. This was significant when account was taken of the different total dosages and different durations of treatment. Thus, in general, the smaller doses given two or four times daily over the longer period of time were more beneficial than larger doses given once daily over the shorter period of time.

Summary of Experimental Results

Throughout these experiments it was observed that treatment beginning 48 hours after infection was more effective than treatment begun 6, 24, 72, or 96 hours after injection of the culture. This phenomenon is the subject of further study. It was also observed that groups of mice receiving large doses of the antibiotic had a substantial proportion of survivors, but deaths occurred in two patterns—one early and one late. This is evident in tables 1, 2, and 3 and in the example to table 1. Not infrequently negative brain cultures were found among mice dying early, which was unusual for mice dying during the observation period. These deaths are attributed to combined toxicity of the infection and treatment. A single dose of 10.0 mg. of aureomycin apparently approached the toxic level in infected mice but was not toxic for noninfected mice. It is concluded from the laboratory data that aureomycin given subcutaneously to white mice in doses which did not apparently impair their health delayed and prevented deaths following intracerebral infection with *H. pertussis*. In general, a treatment regime of small doses given at frequent intervals over a period of several days was more effective than larger doses given singly or at infrequent intervals for a few days.

Preliminary Clinical Findings

Clinical trial of aureomycin is under way in Norfolk, Va., where one of the authors has continued a study of pertussis for more than 10 years. The study has been described elsewhere (*6*) and provides detailed clinical records of the duration, frequency and intensity of cough, paroxysmal cough, whooping, and vomiting in many untreated cases of pertussis. The data have been collected with meticulous uniformity, and the untreated cases appear suitable for controls in a study of aureomycin treatment carried out in the same general population group by the same observers.

The Norfolk Health Department, local physicians, and visiting nurse associations were requested to report all early cases of pertussis so that they could be studied to evaluate aureomycin treatment. To date, 20 cases have been treated and observed long enough to indicate the results. All treated cases had definite paroxysmal cough with vomiting, and whooping in all but 4. These 4 were younger siblings of patients whose cases were characterized by whooping. In each case, nasal pharyngeal swabs were taken in the homes by Public Health Nurses Anne Hodges and Mary Miller on the two consecutive days prior to treatment. The swabs were cultured for isolation of *H. pertussis* by the Norfolk City Health Department laboratory under direction of A. D. Farmer. A positive bacteriological diagnosis was reported when a gram-negative organism was isolated that had the cultural appearance, morphology, and agglutination characteristics of *H. pertussis*. Cultures from the first 7 cases were negative, but the relatively large amounts of penicillin used in the culture media for these cases was later found to inhibit growth of *H. pertussis*. Of the next 13 cases, 9 yielded positive cultures and 4 negative cultures. Three of these with negative cultures had siblings who gave positive cultures and the remaining case with a negative culture was observed repeatedly by the nurses during typical paroxysms with whooping and vomiting Thus, substantial evidence supports the opinion that all treated illnesses were pertussis.

The treatment schedule was designed for home use. The time of starting treatment varied from the second to the seventeenth day following onset of paroxysmal cough. In the first 8 cases an effort was made to give a total of 0.5 gm. of aureomycin per kilogram of body weight in divided doses over a period of 4 days. When additional laboratory data were available, the schedule was changed to give the same total dose over an 8-day period. It is noteworthy that the amount of drug retained by small children having a disease characterized by frequent vomiting can only approximate the scheduled dosage. The administration of the aureomycin had to be supervised by the nurses in many instances. The usual procedure consisted in putting the contents of one or two 250-mg. capsules in a cup, mixing it with a teaspoonful of sweet cherry syrup, and immediately administering it orally. When vomiting occurred immediately, the procedure was repeated.

The age of the patients varied from 1 month to 6 years The number of cases is too few to evaluate the influence of the numerous attributes, e. g., age, sex, etc., which might possibly affect the clinical course of the disease. These will be analyzed in a future report. Paroxysmal coughing often attended by whooping and vomiting defined in a previous report (*6*)—is the only uniformly characteristic clinical manifestation of pertussis. Accordingly, the duration, frequency, and intensity of paroxysmal cough are the chief criteria for evaluating the effect of the therapeutic agent. In this study the mothers kept a daily record of the occurrence, frequency, and intensity of paroxysmal cough, whooping, and vomiting, and the nurses visited almost daily to check the reliability of the data and to make sure that it was recorded in a uniform manner.

Table 5 shows the duration of paroxysmal cough in the 20 treated cases and 380 untreated controls. The latter represent some of the nonvaccinated and nontreated cases of the study referred to above. It will be noted that the duration of paroxysmal coughing in the control cases occurring during 1938 to 1942 was essentially the same as in those occurring during 1942 to 1947. This confirms the uniformity with which the data have been collected over a long period of time and is good evidence of the adequacy of these cases for controls.

The duration of paroxysmal coughing was less than 30 days in only 21 percent, or 79 of the 380 untreated controls, whereas the duration was less than 30 days in 85 percent, or 17 of the 20 treated cases (table 5). The question arises as to whether this favorable result in the treated cases was due to the aureomycin treatment per se or to other unrecognized causes. Further study of a larger experience will be necessary to answer the question. However, the data show

Table 5. *Duration of paroxysmal cough in treated and untreated cases of pertussis*

	Interval onset Pc to treatment (days)	Year of occurrence	Total cases	Days duration of paroxysmal cough			
				< 20	20-29	30-39	40+
Untreated cases	-	1938-42	165	11	25	42	87
		1942-47	215	14	29	47	125
Total			380	25	54	89	212
Aureomycin treated cases	2-10	1949	7	7	0	0	0
	11-17	1949	13	0	10	2	1
Total			20	7	10	2	1
Expected number of treated cases if distributed like untreated cases			20	1	3	5	11

that among the treated cases the shortest duration of paroxysmal cough occurred in those treated early in the course of the disease Thus, the duration of the clinical disease was directly related to time treatment was started, and the favorable result appears to be due to the aureomycin treatment. Whooping and vomiting are part of the characteristic paroxysmal cough of pertussis, and their duration was curtailed in a like manner.

The daily record of the frequency of paroxysms showed a prompt but gradual reduction in the number of paroxysms in practically all treated cases. This was directly related to the period of time treatment was administered. The mothers of nearly all treated children were unanimous in their opinion that the severity of the paroxysms was promptly modified. They particularly noted the early subsidence of night coughing and vomiting. Some noted loose stools and yellow urine in children retaining the larger doses of aureomycin.

Summary and Conclusion

Aureomycin hydrochloride given subcutaneously to mice in apparently nontoxic doses not only delayed the time of death but also prevented deaths due to prior intracerebral infection with *H. pertussis*. Small doses of the drug given at 12-hour intervals over a period of 8 days were more effective than large doses given over a short period of time.

Preliminary clinical trials in 20 cases of pertussis when compared with 380 untreated cases suggest that aureomycin given orally in apparently nontoxic doses shortened the clinical course of the disease. In only a few, particularly the cases treated early, was the clinical response to aureomycin considered dramatic in the sense that complete recovery immediately followed a few days of treatment. However, in practically all cases a prompt but gradual diminution in the frequency and intensity of paroxysms was observed. Some difficulty was encountered in making sure that specified amounts of the drug were retained by young children with pertussis. No untoward effects resulted from treatment.

Aureomycin hydrochloride is effective for treatment of *H. pertussis* infection in mice and looks promising for treatment of the human disease. Further clinical trials are necessary to establish its value for general treatment of clinical pertussis.

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Simple and Efficient Transport Method for Gonorrheal Specimens

By Lenore R. Peizer, B. A., Gustav I. Steffen, Ph. D. and Sarah Klein, B. A.*

The culture method is the most valuable aid in the diagnosis of gonorrhea and in the establishment of cure. The method of transportation of gonorrheal specimens from the source to the laboratory plays an important role in determining the accuracy of culture diagnosis. Even when the source is close enough so that the specimens reach the laboratory within 4 hours, the method of conveyance is important. Thus, specimens streaked on solid medium at the clinic and transported to the laboratory yield more accurate results than do those placed into a liquid transport medium (*1*). When specimens cannot reach the laboratory within 20 to 24 hours, accurate culture diagnosis becomes even more difficult.

Various methods of transportation of gonorrheal specimens have been studied in our laboratory for a number of years and the method described in this paper appears to be simpler and more practical than those generally employed in localities where direct messenger service is not available.

The following simple medium is effective during a transport period of 24 hours:

To one liter of distilled water add:
5 grams corn starch.
10 grams Bacto peptone.
3 grams NaCl.
10 grams Bacto agar.

Stir well and heat in the Arnold sterilizer to dissolve the ingredients. Distribute in convenient amounts and sterilize at 15 pounds pressure for 20 minutes in the autoclave. To each 30 ml. of the melted cooled agar base add the following sterile solutions under sterile conditions in the following order:

2.1 ml. 15% $Na_2HPO_4 \cdot 12H_2O$.
0.2 ml. 10% cysteine monohydrochloride.
1.0 ml. 1% $CaCl_2$ (anhydrous).
5.0 ml. 20% bovine albumin "V" fraction in saline.[1]
1.0 ml. 0.08% gentian violet (powder) in distilled water.[2]

[1] Bovine albumin powder fraction V of bovine plasma. Manufactured and packed by the Armour Laboratory.

[2] Gentian Violet U. S. P. Fisher Scientific Co., Pittsburgh, Pa.

Tube 2 ml. quantities of the medium into 4″ x 7/16″ I. D. test tubes. After the medium hardens most of the air in the tubes is replaced with gaseous CO_2 and the cotton plugs are replaced by sterile rubber stoppers.

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*From the Bureau of Laboratories, New York City Department of Health.

Mailing outfits, each consisting of one or two carrying tubes containing sterile swab applicators in a mailing container, may easily be assembled. A slip with instructions and a case history slip may be included. The medium in the carrying tubes remains usable for at least 2 months. Carrying tubes containing medium should be kept in the dark. When kept for over a week, they should be stored in a refrigerator.

The largest possible quantity of suspected fresh discharge should be taken from the patient by means of a swab applicator. While holding the carrying tube vertically to reduce the loss of CO_2, the applicator, of the right length to fit into the tube, is stuck into the agar. The rubber stopper is replaced securely. When the specimen reaches the laboratory, the applicator swab is removed from the carrying tube and is used for inoculation of medium suitable for primary cultivation of the gonococcus.

This carrying medium is a solid medium prepared from dry ingredients, all of which are easily obtained. It does not support primarily gonococcus growth under optimal conditions.

Experimental

Control and transport specimens were taken simultaneously from 125 female patients with acute gonorrhea at the Fort Greene Clinic in Brooklyn, N. Y. The control specimens were streaked on the Peizer-Steffen (*2*) medium in the clinic and the plates were incubated within 6 hours after the seeding. The transport specimens remained in the carrying tubes at about 20°–26° C. for 24 hours. They were then used to inoculate plates which were incubated for 40 hours at 36° C. in 10 percent CO_2. Corresponding control and transport cultures were then compared.

The results as seen in table 1 indicate that there was generally a decrease in the number of gonococcus colonies in cultures from the

Table 1

Control cultures incubated within 6 hours		Transport cultures incubation delayed 24 hours	
Approximate number gonococcus colonies	Number specimens	Approximate number gonococcus colonies	Number specimens
300+	14	300+	10
200–300	30	200–300	22
100–200	46	100–200	33
25–100	21	25–100	32
1–25	12	1–25	19
0	2	0	9
Total	125		125

transport medium. Nine specimens, about 7 percent, became negative during the transport period. On the other hand, two specimens, about 1.5 percent, which were positive in the transport medium were negative in the direct culture group.

Nile Blue A and gentian violet were tested as inhibitors of contaminants. It was found that the gonococcus tolerates Nile Blue A in the transport medium up to 10 times the amount it safely tolerates in the medium used for primary cultures. When 12.5 times this amount was used, however, definite inhibition of gonococci in the transport specimens occurred. It was found, on the other hand, that Nile Blue A, though effective in medium used for primary cultures, did not sufficiently inhibit many of the contaminants in the transport medium even where the maximum amount was employed.

It is known that when gentian violet is used in effective amounts in media employed for primary gonococcus growth, it completely inhibits about 12 percent of known positive cultures. However, 0.002 percent of gentian violet incorporated in this carrying medium effectively checked the growth of most concomitant organisms in the specimens and did not seem to be toxic for the gonococcus during the transport time of 24 hours.

Three specimens were taken simultaneously from each of 90 positive female patients. One specimen was used for streaking a control plate; another was placed into a carrying tube containing transport medium with 0.0024 percent Nile Blue A; the third specimen was placed into a carrying tube of transport medium with 0.002 percent of gentian violet. The control plates were incubated within 6 hours. The transport specimens were taken out of the tubes after 24 hours at about 20°-26° C. and were used to inoculate Peizer-Steffen agar plates. Transport cultures were compared, after incubation with their respective controls and with each other.

Table 2 shows results obtained when 0.002 percent of gentian violet was used and when 0.0024 percent Nile Blue A (10 times the amount

Table 2

90 positive control specimens incubated within 6 hours (Peirer-Steffen agar)		90 positive specimens incubation delayed 24 hours							
		Transport medium with 0.0024 percent Nile Blue A				Transport medium with 0.002 percent gentian violet			
		Number negative		Number positive		Number negative		Number positive	
Contaminated [1]	Apparently pure	Sterile	Overgrown	Contaminated	Apparently pure	Sterile	Overgrown	Contaminated	Apparently pure
58	32	3	10	56	21	3	2	51	34

[1] Positive gonococcus cultures were called contaminated when contaminating colonies were evident on gross examination and were called apparently pure when no contaminating colonies were seen on gross examination.

used in primary culture plates) was incorporated in the transport medium. As seen in the table, 13 cultures or about 14 percent were lost in the carrying medium with Nile Blue A, while 5 cultures or about 5.5 percent were lost in the carrying medium with gentian violet. The loss of most of the positives in the Nile Blue A tubes was due to overgrowth by contaminants.

It is believed by some (*3*, *4*) that CO_2 helps preserve gonococci in specimens during transportation. The effect of CO_2 on positive specimens during transportation in this medium was determined by omitting it from the carrying tubes of one set of specimens and including it in another set taken simultaneously from each of 79 patients with acute gonorrhea.

Results shown below indicate no significant difference with this particular transport medium. In previous tests, the McClure and Miller (*5*) method of transportation yielded 98 percent of positives when CO_2 was used and 94 percent when omitted; the Usher and Stein method yielded 89 percent with CO_2 and 79 percent without it.

	Number	*Percent*
Control cultures streaked on Peizer-Steffen medium, incubation within 6 hours	79	100
Transport specimens, incubation delayed 24 hours:		
With CO_2	75	94
Without CO_2	73	92

Discussion

During this study it became apparent that since gonococcus does not multiply at temperatures prevalent during transportation of specimens, the various growth stimulating substances usually added to transport medium serve no practical purpose. If there is any effect, it is detrimental since the enriched medium stimulates luxuriant growth of the usual contaminants in the specimens, which grow well at transport temperatures. Many positive gonococcus cultures are lost because of overgrowth by contaminants.

Substances needed in a transportation medium are those which serve only to preserve the gonococci in positive specimens and those which inhibit multiplication of the usual concomitant organisms found in gonorrheal specimens. The transport medium described here does not support the growth of gonococci. It does, however, conserve most of the organisms in positive gonorrheal specimens.

It is important in preparing the medium, to add the ingredients to the melted, cooled agar in the order given in the formula, to prevent the formation of a precipitate which tends to inactivate the cysteine. When cysteine is used in medium containing plasma, it seems to be most effective when added to the cooled, melted agar before the enrichment. The amount of cysteine giving the best results was found to be 0.02 to 0.05 percent. Larger amounts tend to inhibit the growth of gonococci.

Summary

1. A simple carrying medium for transportation of gonorrheal specimens is described. The medium is prepared from easily obtainable ingredients and may be stored in the refrigerator for at least 8 weeks. It does not support primary growth of gonococci. It is effective as a transport medium during 24 hours of delay in inoculation and incubation of isolation culture plates.

2. It was found that in this medium 0.002 percent of gentian violet is more effective as an inhibitor of contaminating organisms than 0.0024 percent of Nile Blue A. This amount of Nile Blue A is 10 times that used effectively in medium for primary gonococcus growth.

3. The addition of CO_2 to the transport medium tube had no significant effect.

4. Mailing outfits may be easily assembled.

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Diarrheal Disease Control Studies

II. Conical Net for Collecting Flies

By Paul P. Maier and Richard P. Dow*

It is sometimes necessary to collect very large numbers of muscoid flies for laboratory studies. The success of these investigations may depend on uniform freshness of specimens, wide representation of the local fauna, freedom from artificial contamination, and other considerations such as natural occurrence in a specific place (not attracted by bait from a distance).

The customary baited traps are not satisfactory for several reasons. First, they are large and clumsy to handle. Second, it may be difficult to procure them in the required numbers on short notice. Third, the baits to be used as attractants must be selected with regard not only to sterility, but also their ability to compete with other fly-attracting materials in the same surroundings. Fourth, since a trap must usually be exposed for a number of hours, the flies caught are not in equally fresh condition, and if only live material is desired, it is difficult to separate living from dead specimens. Finally, traps are frequently upset or stolen.

The conventional insect net is likewise impractical when large collections must be made. Its principal shortcoming lies in the fact that when swept over any sizable concentration of flies, it disturbs more individuals than it catches, and much time is lost in waiting for the scattered flies to return. Other objections are the difficulties met in transferring the specimens to containers suitable both for transportation to the laboratory and for handling the collections upon arrival.

A new type of conical net obviates all of these difficulties. Its operation takes advantage of the tendency of muscoid flies to fly toward light when the illumination of their environment is suddenly reduced. It was found that a cone of wire screening could be moved over an area attractive to flies and lowered to the ground without dispersing more than a few individuals. By placing a cylindrical cage of wire screening over a small hole in the top of the cone, and then rapidly covering the rest of the cone with a cape of heavy cloth (fig. 1), it was possible to concentrate all the trapped flies in the cage within a few seconds.

The fly cone is 30 inches in diameter at the base, but so light (2½ pounds) that it can be handled very easily by the small ring at

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Part I, Effect of Fly Control in a High Morbidity Area, was published in PUBLIC HEALTH REPORTS 63: 1319-1334 (1948).

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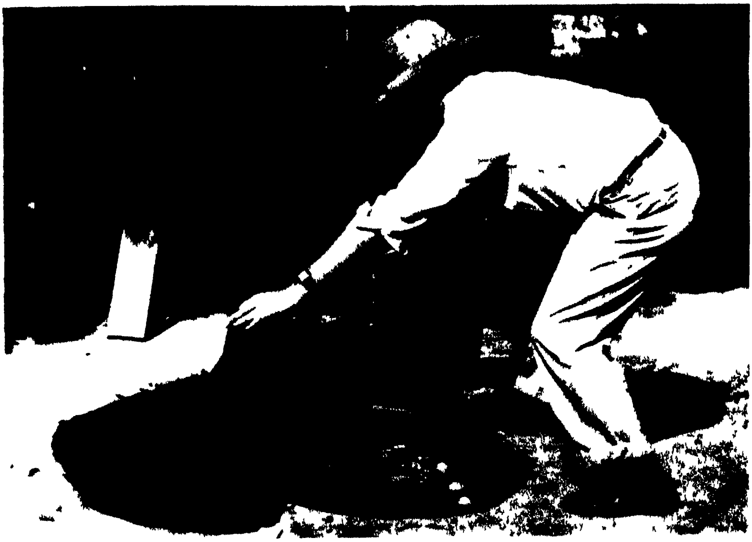

Figure 1. Spreading cape around fly cone.

Figure 2. Operator ready to close collecting cage.

the top. In addition to being lowered over an attractive surface, the cone can be held at an angle and used to sweep flies out of weeds or toward more level ground. When an operator has acquired the necessary skill, it can even be employed to catch flies flushed from a garbage can or barrel.

The cloth cape of a dark material, such as blue denim, is cut to fit the cone, but is large enough to extend 6 inches beyond the base. This is important because flies will escape near the ground if light enters under the net. In fact, it is always wise to close the cape first at the bottom.

The collecting cage, which fits on the ring at the top of the cone, is set in place just after the flies have been trapped. It can be made of the same wire screening as the cone, but 20-mesh is preferable in order to prevent the escape of smaller flies. The lid, which is slipped over the end of the cage just as it is lifted from the cone, is held in place by clamps made of metal stripping (fig. 2). In a dry or excessively hot climate, the cages should be kept in a cool, or at least humid, container until the flies can be brought to the laboratory where they are anesthetized and sorted.

The apparatus is constructed as follows:

The cylindrical cages (fig. 3A) of 20-mesh screening sewed with wire (*a*) are soldered to rings ⅝-inch wide (*b*), which are cut from No. 3 cans and flared to fit unused can lids (also size 3) as supplied to canneries. A cone of 18-mesh galvanized wire screening, 30 inches in diameter at base, is fitted over a framework of 9-gage galvanized wire, 17 inches high (fig. 3C). The upper ends of the four supporting rods (fig. 3B, *c*) are bent to fit under a wire ring of 3¼ inches inside diameter (*d*) and are soldered to the ring (fig. 3D). The cone of screening (*e*) is next soldered to the top of the framework, and after the outer margin of the screening has been bound with adhesive tape, it is rolled over the wire ring of the base and sewed in place with copper wire, which is also used to close the seam. The screening is left free from the supporting rods. A strip of banding steel ⅜-inch wide (*f*) is riveted to form a ring 3¾ inches in diameter and soldered firmly to the top of the cone. Finally, a very flat cone of screening (*g*), with a hole at the apex about ¾-inch in diameter, is soldered to the inner surface of the ring assembly.

For making large collections of common calypterate and acalypterate flies for medical studies, the fly cone has more than demonstrated its efficiency. Since first used, it has been found to have other applications. One is to collect flies following their exposure to space sprays in order to observe the lasting effect of the insecticide. This permits comparative studies of both equipment and insecticides without the disadvantage of having to expose test specimens in

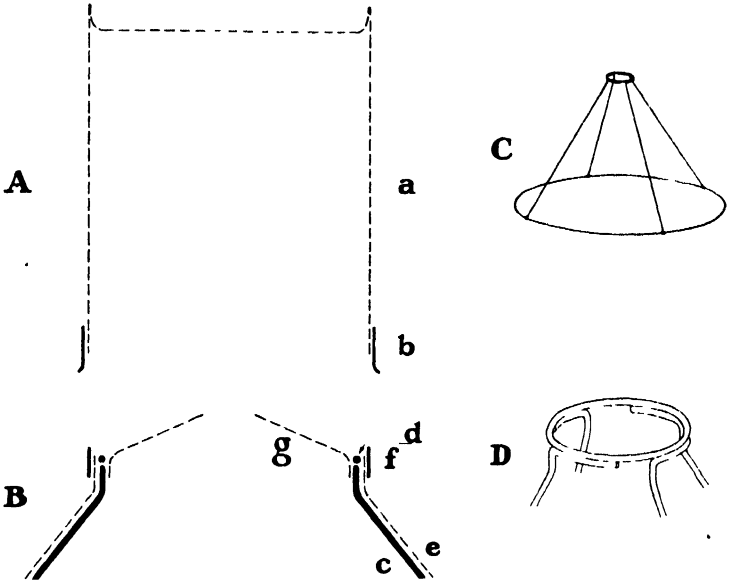

Figure 3.—Construction of fly cone.

A. Diagrammatic section of collecting cage.
B. Diagrammatic section of top of fly cone.
C. Diagram of framework.
D. Detail of supporting rods.

cages with screening which interferes with the dispersion of the spray. A second use is to study the various species of flies attracted to particular baits, such as various foods and excrement of different animals. A third is the collection of wild flies which have been allowed to feed on sterile food. A fourth application, for which a larger pyramidal model has been built, is to evaluate the method of measuring fly densities which was developed by H. I Scudder.[1] To study the fly counts obtained by the grill method, the net is lowered over the grill as soon as the reading is complete, and the resulting collection of flies is identified for comparison with the species break-down of the grill count. Other uses for the fly cone are likely to be found as the need develops.

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PUBLIC HEALTH SERVICE PUBLICATIONS

July–December 1948

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PERIODICALS

*Public Health Reports (weekly) July–December, vol. 63, Nos. 27–53, pages 865 to 1726. 10 cents a copy. Subscription price $4 a year.

Extracts from Public Health Reports (monthly) July–December, Tuberculosis Control Issues Nos. 29 to 34. Average 30 pages each. 10 cents a copy. Subscription price $1 a year.

*The Journal of Venereal Disease Information (monthly) July–December, vol. 29, Nos 7 to 12, pages 193 to 403. 10 cents a copy. Subscription price 75 cents a year.

*Journal of the National Cancer Institute (bimonthly) August–December, vol. 9, Nos. 1 to 3, pages 1 to 260 40 cents a copy. Subscription price $2 a year.

Public Health Engineering Abstracts (monthly) July–December, vol. XXVIII, Nos. 7 to 12, 32 pages each. No sales stock.

Industrial Hygiene Newsletter (monthly), July–December, vol. 8, No. 7, 12 pages; Nos. 8 to 12, 16 pages each. 10 cents a copy. Subscription price $1 a year.

National Negro Health News (quarterly), July December, vol 16, Nos. 3 and 4 24 pages each. No sales stock.

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Compilation of Public Health Service regulations. Supplements Nos. 30-33, October 26 through December 4, 1948. 4 pages. (For official use only.)

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INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 23, 1949

For the current week a total of 29,165 cases of measles was reported, as compared with 27,750 last week and a 5-year (1944 48) median of 27,438 (reported for the corresponding week last year). An aggregate increase of 2,605 cases was reported in the Middle Atlantic, North Central, South Atlantic, East South Central, and Mountain areas. A combined decrease of 1,190 cases occurred in the New England, West South Central, and Pacific areas. The largest numbers (last week's figures in parentheses) were reported in the Middle Atlantic area, 7,381 (6,117), East North Central, 4,059 (3,928), South Atlantic 4,540 (3,778), and West South Central, 3,584 (4,305). The 5 States reporting more than 1,500 cases each (last week's figures in parentheses), are New York, 2,834 (2,475), New Jersey 2,213 (1,586), Pennsylvania 2,334 (2,056), Wisconsin 1,889 (1,984), and Texas 2,405 (3,013). To date this year 372,880 cases have been reported, as compared with a 5-year median of 278,171 (reported last year).

Of the total of 2,288 cases of influenza, as compared with 2,606 last week and a 5-year median of 1,691, only 2 States reported more than 195 cases—South Carolina 623 (last week 304), and Texas 931 (last week 1,009). The total to date is 63,323, 5-year median 180,632.

Of 45 cases of poliomyelitis reported, the same number as last week's total, Utah reported 8, Texas 7, California 5, Mississippi 4, and North Carolina 3, no other State reporting more than 2 cases. The total for the corresponding week last year was 39 and the 5-year median is 32. The total since March 19 (average date of seasonal low incidence) is 225 and the corresponding 5-year median 142.

During the week, 5 cases of smallpox were reported, 1 each in Missouri, South Dakota, Kentucky, Texas, and New Mexico; 4 cases of Rocky Mountain spotted fever, 1 each in Ohio, Maryland, Virginia, and Idaho. New York reported 1 case of anthrax.

During the week 9,521 deaths were recorded in 94 large cities in the United States, as compared with 9,232 last week, 9,226 and 9,513, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 9,502. The total for the year to date is 156,890, as compared with 160,837 for the corresponding period last year. Infant deaths totaled 638 for the week, last week 608, 3-year median 662. The cumulative figure is 10,553, same period last year 11,079.

Telegraphic case reports from State health officers for week ended April 23, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [d]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	1		3	426	1	10			14				26	
New Hampshire			1	87		2			4				7	
Vermont				158					4			1	4	
Massachusetts	20	1		748	1				117			2	63	
Rhode Island				146		11			11			1	2	
Connecticut	15		3	1,418		53			37				11	
MIDDLE ATLANTIC														
New York	9	4	[b] 1	2,834	8	383			[c] 260			2	140	5
New Jersey	2		2	2,213		72	2		146				44	2
Pennsylvania	10	1	(b)	2,334	2		1		202		1	3	73	1
EAST NORTH CENTRAL														
Ohio	5		4	921	6	77		1	261			1	38	13
Indiana	8		1	211		16			43			2	19	21
Illinois	1		8	232	7	134	1		138		1	2	62	1
Michigan [a]	1		3	806	2	88			309		1	2	33	1
Wisconsin			39	1,889	2	6			45				29	
WEST NORTH CENTRAL														
Minnesota	1			197		6			32					
Iowa				67	1	4	2		22				5	9
Missouri	1		1	340	2	9	1		11	1		2	2	
North Dakota			17	45	1				2					
South Dakota				11	1				1	1				
Nebraska			2	161		1			11					
Kansas			12	1,126	1	26			7				14	
SOUTH ATLANTIC														
Delaware				67			1		9				2	
Maryland [a]	3		1	401	1	50		1	[c] 32			2	6	
District of Columbia			1	123		25			9				4	
Virginia			195	1,056	4	69		1	15			1	20	
West Virginia			17	115	1	9			20			2	15	

South Carolina	7	2	623	612	3	175			9				13	1
Georgia	2		13	989		18			2		1		9	10
Florida	1			210	2	22	2		5			3	1	
EAST SOUTH CENTRAL														
Kentucky	4		2	363	4	29			38	1		2	54	12
Tennessee	2		51	563	4	70			20		1	1	62	
Alabama	4	1	75	333	2	75	2		6			2	4	5
Mississippi [a]	8		14	170	2	28	4		8		2	1	1	
WEST SOUTH CENTRAL														
Arkansas	8		121	712		38	1				5	1	14	1
Louisiana	3		1	87	1	38	2		3			4		1
Oklahoma	2		27	380	2	16	1		5		1	1		7
Texas	29		931	2.405	4	312	7		26	1			116	26
MOUNTAIN														
Montana				153					9				7	
Idaho	1		15	155		7		1	[c] 9				1	
Wyoming				26										
Colorado			13	276		16			6			5	4	
New Mexico	1			180		8			8	1				
Arizona	2		68	242		25			13				19	
Utah [a]				94	1	3	8		5				13	
Nevada												1		
PACIFIC														
Washington			2	576		3			27				4	
Oregon	1		9	279	2	7	2		12			3	11	
California	9	1	12	1,261	6	27	5		[c] 86			2	41	3
Total	164	10	2,288	29,165	78	1,968	45	4	2,076	5	14	50	1,020	
Median, 1944-48	195	8	1,691	27.438	112		32	2	3,833	9	13	68	1,952	
Year to date, 16 weeks	2.659	126	63.323	372.880	1.364	37.603	1.147	22	44,091	32	412	680	15,991	
Median, 1944-48	4,432	131	180,632	278,171	2,949		553	11	56,296	158	291	759	34,858	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32d) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	7,773		99,593	425,273	2.208		225		66.789	47		220	26,024	
Median, 1943-48	11,998		311,728	313,117	4.453		142		94,867	234		280	61.295	

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[a] Period ended earlier than Saturday.

[b] New York City and Philadelphia only, res, ectively.

[c] Including cases reported as streptococcal infection and septic sore throat.

[d] Including paratyphoid fever; reported separately, as follows: Virginia 1; North Carolina 1; Florida 2; Louisiana 1; Colorado 1. Oregon 1; California 1; salmonella infections, not included, were reported as follows: New York 1; Pennsylvania 1.

Anthrax: New York 1.
Alaska: Measles 2; scarlet fever 1.
Territory of Hawaii: Diphtheria 1; measles 190; lobar pneumonia 1.

FOREIGN REPORTS

CANADA

Provinces Communicable diseases Week ended April 2, 1949.—During the week ended April 2, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		21	9	242	601	32	24	43	236	1,211
Diphtheria		2		8		1		6		17
Dysentery bacillary				10	3					13
German measles				319	64	1	213	16	10	623
Influenza		99			17	23			4	143
Measles		128	124	132	201	135	118	245	268	1,354
Meningitis, meningococcal		1				2				3
Mumps		66	7	102	439	48	25	16	118	821
Poliomyelitis				1		2				3
Scarlet fever		4	1	101	90			11	7	214
Tuberculosis (all forms)		4	13	151	30	11	7		38	254
Typhoid and paratyphoid fever			4	6						10
Venereal diseases										
Gonorrhea	1	10	4	85	57	27	15	25	63	287
Syphilis	1	5	11	84	50	5	6	6	17	185
Whooping cough		17	1	115	24	4	7			168

GOLD COAST

Cerebrospinal meningitis Information dated April 21, 1949, states that 836 new cases of cerebrospinal meningitis, with 59 deaths, were reported in the Northern Territories, Gold Coast, during the period March 27 April 2, 1949 A total of 8,525 cases, 622 deaths has been reported in that area to date in the present outbreak.

NIGERIA

Cerebrospinal meningitis. According to information dated April 5, 1949, 26,734 cases of cerebrospinal meningitis, with 6,359 deaths, have been reported in the Northern Provinces, Nigeria, from the beginning of the year to April 2, 1949. Confirmed figures reported for the week ended April 2, are as follows: Argungu, 460 cases, 36 deaths; Gusau, 1,063 cases, 109 deaths; Katsina, 975 cases, 83 deaths; Port of Sokoto medical area, 1,650 cases, 383 deaths; Sokoto City, 16 cases, 2 deaths.

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases All reports of yellow fever are published currently

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month

Cholera

India—Calcutta.—During the week ended April 9, 1949, 255 cases of cholera with 69 deaths were reported in Calcutta, India.

Plague

India.—During the week ended April 9, 1949, 29 cases of plague with 6 deaths were reported in Cawnpore, India, and 10 cases, 1 death, were reported in Calcutta.

Peru.—For the period March 1-31, 1949, plague was reported in Peru as follows: In Uchupata, Huancabamba Province, Piura Department, 3 cases, 1 death; in Monsefu, Chiclayo Province, Lambayeque Department, 1 case, 1 death.

Smallpox

Egypt—Port Said.—Information dated April 22, 1949, states that an outbreak of nonepidemic smallpox has been reported in Port Said, Egypt. Three cases are stated to have occurred during the previous few days.

Great Britain—England and Wales—Port of London.—According to information received from London, dated April 20, 1949, 7 additional confirmed cases of smallpox have been reported in England, and the number of deaths has risen to 5. All these cases are stated to be considered direct importations from the liner *Mooltan.* One case each has occurred in Torquay, Liverpool, a small town in Lincolnshire, Sutton in Surrey, Richmond, and Aylesbury. The rest are all in the London area. Two of the cases reported confirmed were in persons traveling from London to other points. It is estimated that there may have been as many as 48 contacts altogether.

Portugal—Lisbon.—During the week ended April 2, 1949, 2 cases of smallpox were reported in the city of Lisbon, Portugal.

Republic of the Philippines—Mindoro Island.—Details of the epidemic of smallpox which occurred in Mindoro Island, Republic of the Philippines, during the year 1948, have been received. The first case is stated to have occurred on April 5, 1948, in the town of Pinamalayan, and the last case on December 16, 1948, in the town of Mansalay. The total number of cases reported during this period was

282, with 103 deaths. Distribution was as follows: Pinamalayan 27 cases, 8 deaths; Roxas 14 cases, 5 deaths; Mansalay 178 cases, 66 deaths; Bongabong 63 cases, 24 deaths.

Yellow Fever

Brazil—Amazonas State.—On January 23, 1949, 1 death from yellow fever was reported in Benjamin Constant, Amazonas State, Brazil.

DEATHS DURING WEEK ENDED APR. 16, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Apr. 16, 1949	Corresponding week, 1948
Data for 94 large cities of the United States		
Total deaths	9 232	
Median for 3 prior years	9 127	
Total deaths, first 15 weeks of year	147 369	151 611
Deaths under 1 year of age	608	659
Median for 3 prior years	659	
Deaths under 1 year of age, first 15 weeks of year	9 915	10 417
Data from industrial insurance companies		
Policies in force	70 481 914	71 083 995
Number of death claims	10 943	13 429
Death claims per 1,000 policies in force, annual rate	8.1	9.9
Death claims per 1,000 policies, first 15 weeks of year, annual rate		10.6

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world, (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

The PUBLIC HEALTH REPORTS is published primarily for distribution, in accordance with the law, to health officers, members of boards or departments of health, and other persons directly or indirectly engaged in public health work. Articles of special interest are issued as reprints or as supplements, in which forms they are made available for more economical and general distribution.

Requests for and communications regarding the PUBLIC HEALTH REPORTS, reprints, or supplements should be addressed to the Surgeon General, Public Health Service, Washington 25, D. C. Subscribers should remit direct to the Superintendent of Documents, Washington 25, D. C.

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Public Health Reports

VOLUME 64 MAY 20, 1949 NUMBER 20

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Notifiable Diseases, Fourth Quarter, 1948

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

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FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
C. St. J. Perrott, Chief of Division

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Public Health Reports

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Current Organizational Patterns of Statistical Activities in State Health Departments

By Daniel D. Swinney, M. A.*

The purpose of this article is twofold: to describe the existing patterns of statistical organization in the 48 State health departments and the administrative relationships and functions of those organizations, and to present the opinions of personnel concerned with statistical activities.

Four articles published previously have covered the general organization of statistical activities in State health departments. Linder, in 1939, described the problems of statistical organization from the point of view of the registrar of vital statistics (*1*). The basic patterns he outlined still exist. In 1940, Mountin and Flook (in a revised edition of Public Health Bulletin No. 184) indicated the specific statistical activities that were being carried on in State health departments (*2*). Whitman, in a paper presented at the 1946 Annual Meeting of the American Public Health Association, described the uses made of statistical data by State health departments, and briefly noted current trends in statistical organization (*3*). In 1947, this writer, using official publications and reports, analyzed the current status of statistical organization and the related classification and compensation plans (*4*). National summaries were given, but the information available was not sufficiently detailed to permit analyses and tabulations by States.

This article is based on the results of extensive field investigations in approximately 30 States, and on correspondence or conversations with personnel in the other States. Detailed information was obtained on all aspects of the administration and content of statistical activities and their relationships to the program being administered. These investigations were made in cooperation with subcommittees of the Vital Statistics Section of the American Public Health Association. While this article is limited to problems relating to the organization of statistical activities, subsequent articles will deal specifically with related problems of personnel.

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*Public Health Administrator, Division of Public Health Methods.

For the purpose of this discussion, statistical activities are defined as the collection, tabulation, analysis, and presentation of quantitative data on any aspect of public health services, their administration, environment, or medical content.

Analysis of the organization of statistical activities in the 48 State health departments as of October 1947 reveals that there are five basic patterns of organization.

State health departments having:

1. No central statistical organization; [1]
2. A division of vital statistics with some central statistical services;
3. A division of vital statistics with an independent central tabulating unit;
4. A central statistical division, with an independent division of vital records;
5. A central statistical division covering all registrations and statistical activities.

The distribution of these patterns by State health departments is

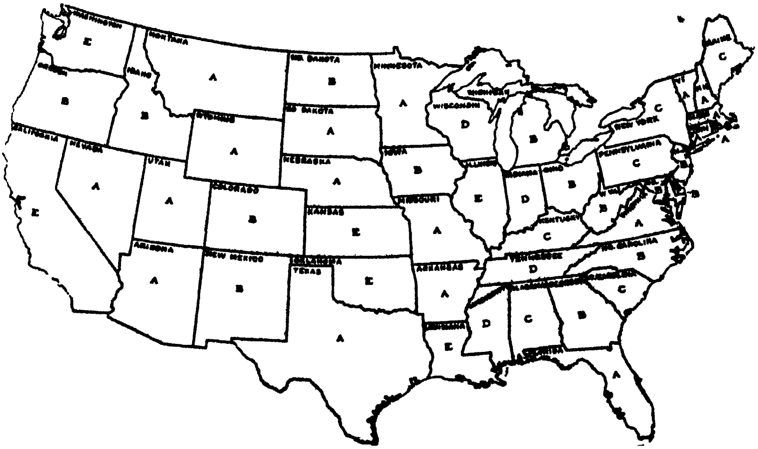

Figure 1. State health departments classified by type of statistical organization as of October 1947.

A. No central statistical organization—18.
B. Division of vital statistics with some central statistical services—14.
C. Division of vital statistics with independent central tabulating unit—6.
D. Central statistical division with independent division of vital records—4.
E. Central statistical division—6.

---

[1] Except the bureau or division of vital statistics which is responsible for the registration, maintenance, and tabulation of births, deaths, etc., and other activities connected directly therewith.

shown in figure 1, and descriptions of the patterns with specific examples are presented in the following pages.

States With no Central Statistical Organization

Eighteen State health departments[3] have no central statistical organization serving the entire department. Each major subdivision of the health department is responsible for all its own record keeping, reporting and statistical functions. The collection, tabulation, and analysis of vital records is the function of a separate division or bureau of vital statistics. The organizational structure of the Minnesota Department of Health indicates a pattern of record keeping and statistical activity similar to that of the other States in this group (fig. 2). All statistical activity in this department is decentralized to the divisional level of administration.

MINNESOTA DEPARTMENT OF HEALTH

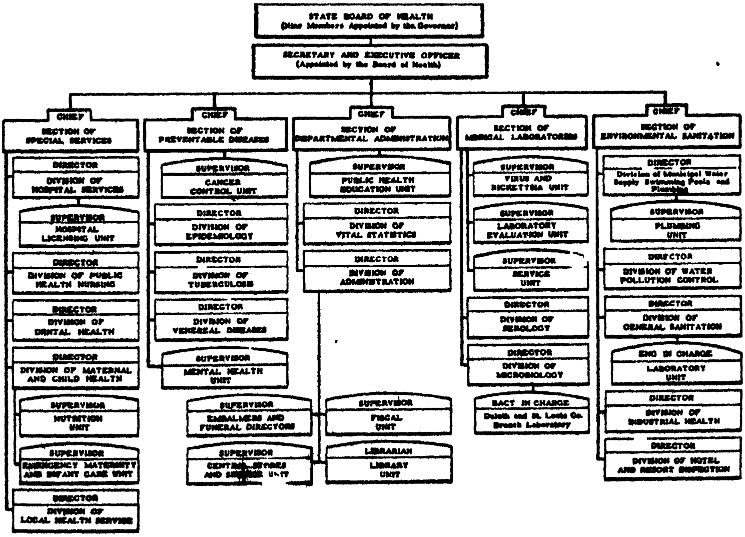
STATE BOARD OF HEALTH
(Nine Members Appointed by the Governor)
SECRETARY AND EXECUTIVE OFFICER
(Appointed by the Board of Health)
CHIEF
SECTION OF SPECIAL SERVICES
DIRECTOR
DIVISION OF HOSPITAL SERVICES
SUPERVISOR
HOSPITAL LICENSING UNIT
DIRECTOR
DIVISION OF PUBLIC HEALTH NURSING
DIRECTOR
DIVISION OF DENTAL HEALTH
DIRECTOR
DIVISION OF MATERNAL AND CHILD HEALTH
SUPERVISOR
NUTRITION UNIT
SUPERVISOR
EMERGENCY MATERNITY AND INFANT CARE UNIT
DIRECTOR
DIVISION OF LOCAL HEALTH SERVICE
CHIEF
SECTION OF PREVENTABLE DISEASES
SUPERVISOR
CANCER CONTROL UNIT
DIRECTOR
DIVISION OF EPIDEMIOLOGY
DIRECTOR
DIVISION OF TUBERCULOSIS
DIRECTOR
DIVISION OF VENEREAL DISEASES
SUPERVISOR
MENTAL HEALTH UNIT
CHIEF
SECTION OF DEPARTMENTAL ADMINISTRATION
SUPERVISOR
PUBLIC HEALTH EDUCATION UNIT
DIRECTOR
DIVISION OF VITAL STATISTICS
DIRECTOR
DIVISION OF ADMINISTRATION
SUPERVISOR
EMBALMERS AND FUNERAL DIRECTORS
SUPERVISOR
CENTRAL STORES AND SERVICE UNIT
SUPERVISOR
FISCAL UNIT
LIBRARIAN
LIBRARY UNIT
CHIEF
SECTION OF MEDICAL LABORATORIES
SUPERVISOR
VIRUS AND RICKETTSIA UNIT
SUPERVISOR
LABORATORY EVALUATION UNIT
SUPERVISOR
SERVICE UNIT
DIRECTOR
DIVISION OF SEROLOGY
DIRECTOR
DIVISION OF MICROBIOLOGY
BACT. IN CHARGE
Duluth and St. Louis Co. Branch Laboratory
CHIEF
SECTION OF ENVIRONMENTAL SANITATION
DIRECTOR
Division of Municipal Water Supply Swimming Pools and Plumbing
SUPERVISOR
PLUMBING UNIT
DIRECTOR
DIVISION OF WATER POLLUTION CONTROL
DIRECTOR
DIVISION OF GENERAL SANITATION
ENG. IN CHARGE
LABORATORY UNIT
DIRECTOR
DIVISION OF INDUSTRIAL HEALTH
DIRECTOR
DIVISION OF HOTEL AND RESORT INSPECTION

Figure 2

In this pattern, each division director has the primary responsibility for the administration of the technical services offered by his division, including the collection, compilation, and analysis of all statistical reports that are needed or required, the initiation and maintenance of all records for the particular program, and the release of data concerning the program to the public and other agencies. The functions of the Division of Vital Statistics at present are primarily limited to the collection, maintenance, and routine analysis of vital statistics. One statistician is employed in that division, and is available for consultation with other divisions on request. Plans are being made to compile and reproduce accident statistics in the future. There are no other statistical units per se in the health department. The record keeping and the reporting requirements for both the State department and the local health units are determined by the professional personnel in the operating programs. Tabulations, analyses, and interpretations of data of a complex character or denoting highly significant trends are the concern of the division director and his assistant.

---

[3] Arizona, Arkansas, Connecticut, Florida, Massachusetts, Minnesota, Missouri, Montana, Nebraska, Nevada, New Hampshire, Rhode Island, South Dakota, Texas, Vermont, Utah, Virginia, Wyoming.

Five of the State health departments in this group have the same type of administrative structure as in Minnesota, while 12 have the various divisions grouped under a small number of bureaus. Actually the only difference in these 12 States is the fact that division directors report to a bureau chief instead of to the State health officer or his deputy. In other words, they are once removed from the top echelon of authority and policy determination. In several of the smaller States, the State health officer is the registrar of vital records, and the director of the division of vital statistics is the assistant registrar. In Nevada, the Division of Vital Statistics is merged with the personnel functions of the department, while in South Dakota vital statistics and public health education are in one division. In Massachusetts, the Division of Vital Statistics is under the Secretary of State, and is not directly associated with the State Department of Health, although a cooperative relationship exists.

In this group of States the functions of the various divisions of vital statistics are all primarily the same—the collection, maintenance, and analysis of data relating to births, deaths, and in some instances marriages and divorces. A few of them are responsible for tabulating the communicable disease reports and for other small statistical services for some other divisions in the health department. They are, however, not centralized statistical divisions in any sense of the word.

Several of these States lack a trained statistician in the State department of health. With a few exceptions, the State health officers recognize the need for the employment of such a person, but are without either funds or candidates for such a position. Approximately one-third of these States have general plans for reorganizing and expanding their statistical activity when funds and personnel become available. In general, the plans for reorganization and expansion stem from the desire to achieve greater administrative efficiency and economy by centralizing and pooling all mechanical tabulating equipment, and to relieve other division directors from administrative detail.

States With a Division of Vital Statistics and Some Centralized Statistical Services

Another pattern of statistical organization appearing in 14 States[3] is the expansion of the functions of the division of vital statistics to include limited statistical services to other divisions. In most of these States such services are restricted to those emanating from mechanical tabulation. This pattern is an outgrowth of the desire to achieve economy and efficiency by pooling all mechanical tabulating equipment and specialized statistical personnel. In general, the program divisions supervise the collection of the data, edit them, and plan the tabulations. The central tabulating unit punches the cards and tabulates the data. The final tables are then returned to the program division for analysis and release. In some instances, routine analyses are made in the tabulating unit. In several of the States, statistical consultant services are made available to other divisions in the health department. In a smaller number of the States extensive analytical studies are made for other divisions.

The Michigan Department of Public Health (fig. 3) has the type of statistical organization described above. This State has a Bureau of Records and Statistics instead of a vital statistics bureau. Plans for the future provide for the expansion of this bureau into a centralized statistical bureau. It cannot now be so classified because of its limited functions.

The specific functions of the central tabulating units vary from State to State. In each of the States of this group, a majority of the major tabulations are processed through the central unit. None of the central tabulating units is, as yet, doing all the tabulating work for all divisions of the health department. In each of the departments some division directors prefer to supervise their own tabulations. In most of the States, however, all the mechanical tabulations are done by the central tabulating unit. The size of the tabulating units and the amounts and types of equipment, of course, vary with the size of the States and the scope of their statistical operations. Most of the States employ at least one person well trained in tabulating procedures and machine equipment. Few of the tabulating supervisors, however, have had formal statistical training. One of the States has no one on its health department staff who is trained thoroughly in mechanical tabulation. The tabulating unit in this instance is actually directed by the IBM[4] service unit in the area.

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[3] Colorado, Delaware, Georgia, Indiana, Iowa, Maryland, Michigan, New Jersey, New Mexico, North Carolina, North Dakota, Ohio, Oregon, West Virginia.

[4] International Business Machine Corporation.

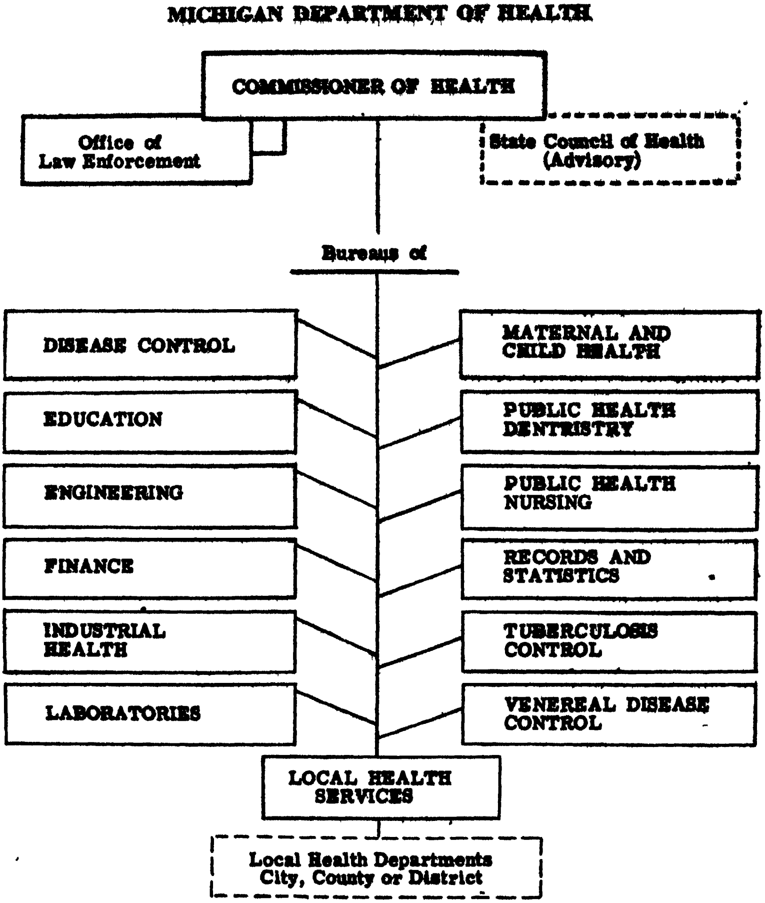

Figure 3

States With a Division of Vital Statistics Plus an Independent Central Tabulating Unit

Six States [5] have a slightly different pattern of organization. They have established a division of vital statistics and an independent central tabulating unit. All other statistical activities are performed by individual program divisions. In other words, all statistical activity except mechanical tabulation is decentralized, and the latter is placed in a separate division that is divorced completely from other statistical activity. In Alabama, New York, and South Carolina, the tabulating divisions are a component part of the bureau of administration or its equivalent.

---

[5] Alabama, Kentucky, Maine, New York, Pennsylvania, South Carolina.

Only one of the six States has a statistician associated directly with the tabulating unit. In New York State, the senior statistician in the Division of Vital Statistics is available to the other divisions for statistical consultation. In addition, the senior statistician often represents the department on statistical matters affecting the department as a whole.

The organization of the Alabama Health Department is typical of the pattern described above (fig. 4). Although most of the actual statistical work of the Alabama Health Department is accomplished under the supervision of the directors of specific programs, the Bureau of Vital Statistics is called upon frequently for statistical consultation, and occasionally does some of the statistical work involved. This is true particularly in the fields of maternal and child health, venereal disease, tuberculosis, and administration. Such consultation and analyses are functions of the analysis unit of that bureau.

ALABAMA STATE BOARD OF HEALTH

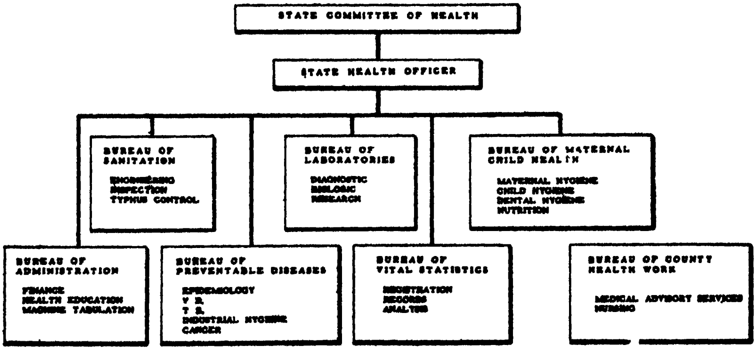

Figure 4

States With a Central Statistical Division Plus an Independent Division of Vital Records

Four States (Indiana, Mississippi, Tennessee, Wisconsin) have centralized their statistical services in an independent division, with a separate division responsible for the registration of vital records. The tabulation and analysis of vital records are among the functions of the statistical division in each of the States. Inasmuch as Tennessee was the first to establish this type of organization, it is of interest

TENNESSEE DEPARTMENT OF PUBLIC HEALTH

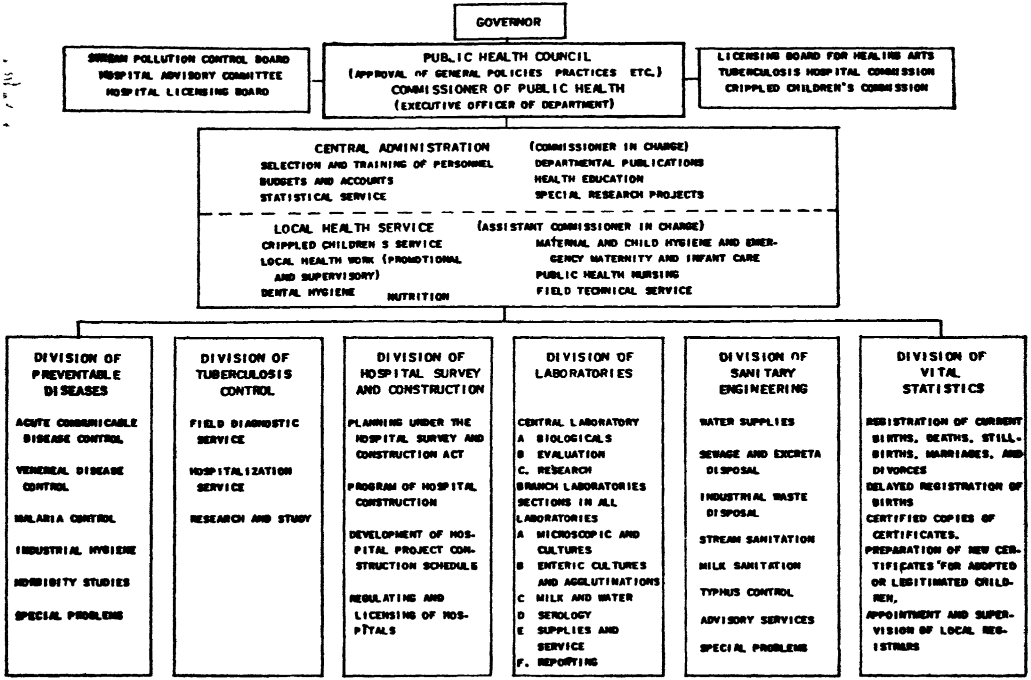
GOVERNOR
STREAM POLLUTION CONTROL BOARD
HOSPITAL ADVISORY COMMITTEE
HOSPITAL LICENSING BOARD
PUBLIC HEALTH COUNCIL
(APPROVAL OF GENERAL POLICIES PRACTICES ETC.)
COMMISSIONER OF PUBLIC HEALTH
(EXECUTIVE OFFICER OF DEPARTMENT)
LICENSING BOARD FOR HEALING ARTS
TUBERCULOSIS HOSPITAL COMMISSION
CRIPPLED CHILDREN'S COMMISSION
CENTRAL ADMINISTRATION (COMMISSIONER IN CHARGE)
SELECTION AND TRAINING OF PERSONNEL
BUDGETS AND ACCOUNTS
STATISTICAL SERVICE
DEPARTMENTAL PUBLICATIONS
HEALTH EDUCATION
SPECIAL RESEARCH PROJECTS
LOCAL HEALTH SERVICE (ASSISTANT COMMISSIONER IN CHARGE)
CRIPPLED CHILDREN S SERVICE
LOCAL HEALTH WORK (PROMOTIONAL AND SUPERVISORY)
DENTAL HYGIENE
NUTRITION
MATERNAL AND CHILD HYGIENE AND EMERGENCY MATERNITY AND INFANT CARE
PUBLIC HEALTH NURSING
FIELD TECHNICAL SERVICE
DIVISION OF PREVENTABLE DISEASES
ACUTE COMMUNICABLE DISEASE CONTROL
VENEREAL DISEASE CONTROL
MALARIA CONTROL
INDUSTRIAL HYGIENE
MORBIDITY STUDIES
SPECIAL PROBLEMS
DIVISION OF TUBERCULOSIS CONTROL
FIELD DIAGNOSTIC SERVICE
HOSPITALIZATION SERVICE
RESEARCH AND STUDY
DIVISION OF HOSPITAL SURVEY AND CONSTRUCTION
PLANNING UNDER THE HOSPITAL SURVEY AND CONSTRUCTION ACT
PROGRAM OF HOSPITAL CONSTRUCTION
DEVELOPMENT OF HOSPITAL PROJECT CONSTRUCTION SCHEDULE
REGULATING AND LICENSING OF HOSPITALS
DIVISION OF LABORATORIES
CENTRAL LABORATORY
A BIOLOGICALS
B EVALUATION
C. RESEARCH
BRANCH LABORATORIES
SECTIONS IN ALL LABORATORIES
A MICROSCOPIC AND CULTURES
B ENTERIC CULTURES AND AGGLUTINATIONS
C MILK AND WATER
D SEROLOGY
E SUPPLIES AND SERVICE
F. REPORTING
DIVISION OF SANITARY ENGINEERING
WATER SUPPLIES
SEWAGE AND EXCRETA DISPOSAL
INDUSTRIAL WASTE DISPOSAL
STREAM SANITATION
MILK SANITATION
TYPHUS CONTROL
ADVISORY SERVICES
SPECIAL PROBLEMS
DIVISION OF VITAL STATISTICS
REGISTRATION OF CURRENT BIRTHS, DEATHS, STILL-BIRTHS, MARRIAGES, AND DIVORCES
DELAYED REGISTRATION OF BIRTHS
CERTIFIED COPIES OF CERTIFICATES.
PREPARATION OF NEW CERTIFICATES FOR ADOPTED OR LEGITIMATED CHILDREN,
APPOINTMENT AND SUPERVISION OF LOCAL REGISTRARS

Figure 5

to review not only its organization (fig. 5) and its relationship to other health department activities, but also its functions. The Statistical Service, it will be noted, is an integral part of the Commissioner's Office. In other words, it is a staff agency providing staff services and technical assistance, but is relieved of any administrative or operating responsibilities. It is not directly responsible for the collection of any basic statistical data. This represents an overt effort of the Commissioner of Health to free the chief of the Statistical Service from all administrative detail in order that time will be available for "thinking the programs through" and for planning, analysis, and interpretation. This organization also is designed to facilitate the elimination of biases which may result from having a vested interest either in a specific program or in the collection of basic statistics regarding that program.

The service provides a central tabulating unit, assistance in the analysis of statistical data, and consultation on any recording or statistical problem in any part of the Tennessee Department of Public Health. Both routine and special studies are planned and conducted in cooperation with the division directors concerned. In order that data may be handled with speed and accuracy, punch cards are used extensively.

The service has a pool of statisticians and statistical workers which may be assigned indefinitely to a particular division, or to work on specific projects. The service supervises and maintains all central registers and is responsible for all statistical reports and releases made to outside agencies. The major statistical analyses are made by or with the assistance of the Statistical Service. The chief of the service is chairman of the Departmental Record Committee, which meets bimonthly and approves new forms and reviews old ones.

A program of statistical activities has been developed, placing emphasis on both administrative and research studies according to the relative needs. Important contributions have been made in both fields of endeavor. Cooperation has been given to a special research center established in the Division of Tuberculosis Control. The service has produced many papers and studies in the fields of public health and statistics. In cooperation with other divisions of the health department, training programs have been and are now being conducted for clerks, statisticians, and other public health personnel, including doctors, needing additional orientation on record-keeping and statistical problems.

Figure 6 shows the functional organization of the Tennessee Statistical Service.

TENNESSEE STATISTICAL SERVICE

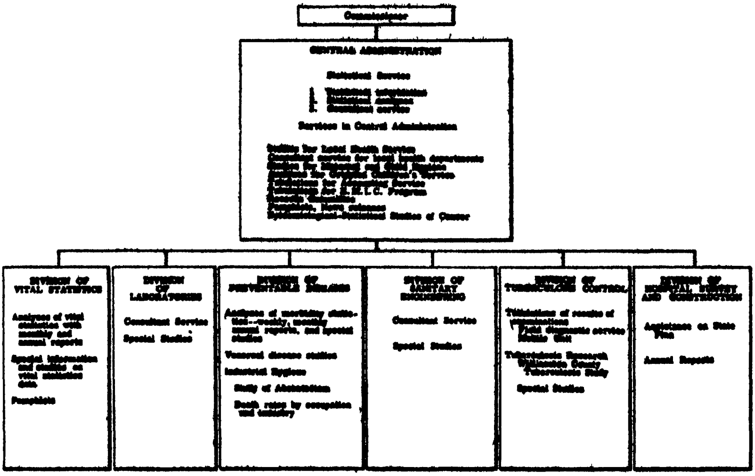
Commissioner
CENTRAL ADMINISTRATION
Statistical Service
Services in Central Administration
Epidemiological-Statistical Studies of Cancer
DIVISION OF VITAL STATISTICS
Analyses of vital statistics with monthly and annual reports
Special information and studies on vital statistics data
Pamphlets
DIVISION OF LABORATORIES
Consultant Service
Special Studies
DIVISION OF PREVENTABLE DISEASES
Analysis of morbidity statistics--weekly, monthly annual reports, and special studies
Venereal disease studies
Industrial Hygiene
Study of Absenteeism
Death rates by occupation and industry
DIVISION OF SANITARY ENGINEERING
Consultant Service
Special Studies
DIVISION OF TUBERCULOSIS CONTROL
Tabulations of results of examinations
Field diagnostic service Mobile Unit
Tuberculosis Research Williamson County Tuberculosis Study
Special Studies
DIVISION OF HOSPITAL SURVEY AND CONSTRUCTION
Assistance on State Plan
Annual Reports

Figure 6

States With a Completely Centralized Statistical Division

Six States[8] have centralized all statistical services, including data collection, in one administrative unit, thus presenting another pattern of administration. Except in California, the directors of the centralized statistical bureaus report administratively to the State health officers. In California the director (or chief of Bureau of Statistics and Records), reports to the chief of the Division of Administration, who also has the Bureau of Business Management, the Bureau of Health Education, and the Office of Recruitment and Training under his supervision.

All the centralized statistical bureaus in these six States are in the beginning stage of their development. All have been established with the intention of centralizing all major statistical operations, and all have made varying degrees of progress toward that end. California has perhaps advanced the most (fig. 7).

The chief of the Bureau of Records and Statistics in California reports administratively to the chief of the Division of Administration who reports to the State Director of Public Health. The major functions of the chief of the Bureau of Records and Statistics may be summarized as follows:

Planning the programs for and directing the collection, tabulation, analysis, and presentation of statistics relating to morbidity, mortality, and all other phases of public health;

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[8] California, Illinois, Kansas, Louisiana, Oklahoma, Washington.

CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH

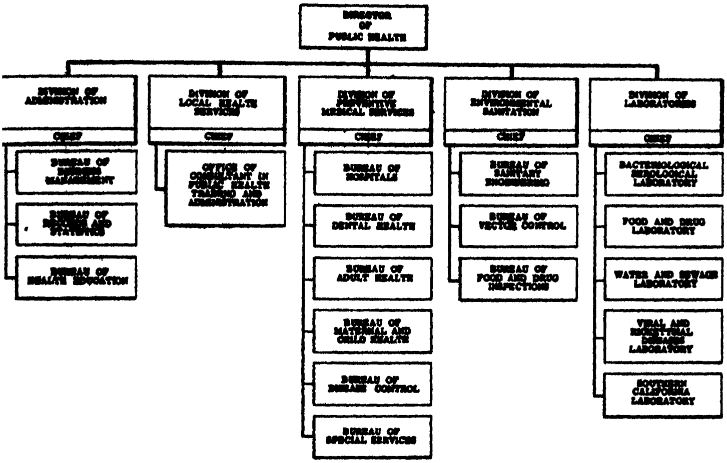

DIRECTOR OF PUBLIC HEALTH
DIVISION OF ADMINISTRATION
CHIEF
BUREAU OF BUSINESS MANAGEMENT
BUREAU OF RECORDS AND STATISTICS
BUREAU OF HEALTH EDUCATION
DIVISION OF LOCAL HEALTH SERVICES
CHIEF
OFFICE OF CONSULTANT IN PUBLIC HEALTH TRAINING AND ADMINISTRATION
DIVISION OF PREVENTIVE MEDICAL SERVICES
CHIEF
BUREAU OF HOSPITALS
BUREAU OF DENTAL HEALTH
BUREAU OF ADULT HEALTH
BUREAU OF MATERNAL AND CHILD HEALTH
BUREAU OF DISEASE CONTROL
BUREAU OF SPECIAL SERVICES
DIVISION OF ENVIRONMENTAL SANITATION
CHIEF
BUREAU OF SANITARY ENGINEERING
BUREAU OF VECTOR CONTROL
BUREAU OF FOOD AND DRUG INSPECTIONS
DIVISION OF LABORATORIES
CHIEF
BACTERIOLOGICAL SEROLOGICAL LABORATORY
FOOD AND DRUG LABORATORY
WATER AND SEWAGE LABORATORY
VIRAL AND RICKETTSIAL DISEASES LABORATORY
SOUTHERN CALIFORNIA LABORATORY

Figure 7

2. Developing records, forms, and procedures for collecting, recording and analysing data on services of the various divisions and bureaus of the State Department of Public Health and local health departments;
3. Maintaining working relationships with local, State, and national agencies or organizations in gathering, recording, and reporting statistics.

The organization of the California Bureau of Records and Statistics is shown in figure 8.

The Vital Records Section (fig. 9) has complete responsibility for the registration of births, deaths, marriages, and related records, their maintenance and coding, and issuance of certified copies. These functions are performed in the offices at the State Capitol in Sacramento.

The Tabulation Section is located in the offices of the State Department of Public Health in San Francisco, and is a complete tabulating unit designed and equipped to meet the mechanical tabulating needs of the entire department. Current arrangements include plans for tabulating all machinework and routine reports in connection with vital statistics, morbidity, adult health, maternal and child health, venereal disease, tuberculosis, and local health department activities. In addition, through the use of punch cards, central registers will be maintained on cancer, tuberculosis, rheumatic fever, typhoid carriers, and handicapped children.

BUREAU OF RECORDS AND STATISTICS

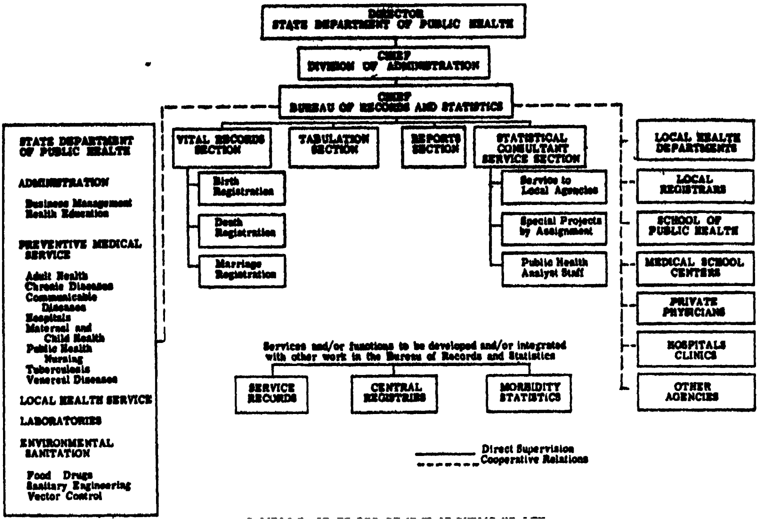
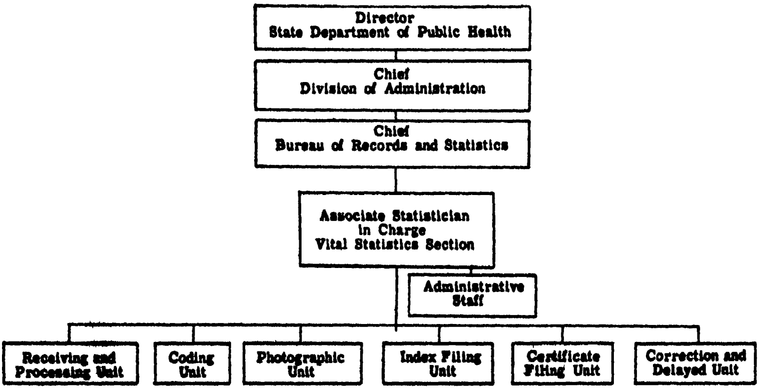


Figure 8

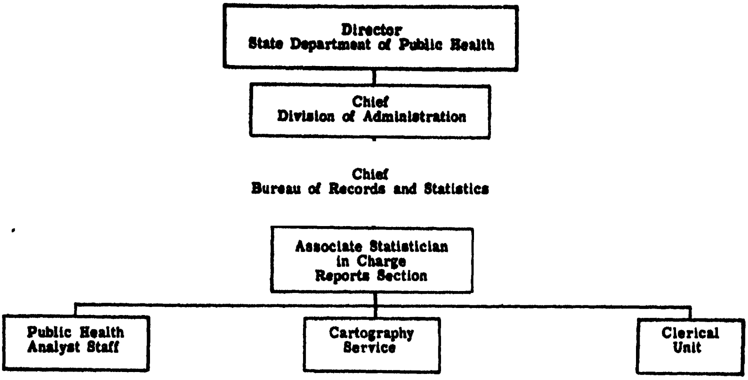
VITAL STATISTICS SECTION


Director
State Department of Public Health
Chief
Division of Administration
Chief
Bureau of Records and Statistics
Associate Statistician in Charge
Vital Statistics Section
Administrative Staff
Receiving and Processing Unit
Coding Unit
Photographic Unit
Index Filing Unit
Certificate Filing Unit
Correction and Delayed Unit

CALIFORNIA STATE DEPARTMENT OF PUBLIC HEALTH
BUREAU OF RECORDS AND STATISTICS

Figure 9

REPORTS SECTION



California State Department of Public Health
Bureau of Records and Statistics

Figure 10

The Reports Section (fig. 10) is the service section of the Bureau. It provides the major statistical services available to other parts of the Department of Health, exclusive of mechanical tabulation. This section is responsible for:

1. Providing consultation with reference to planning statistical studies, to data collection, methods of analysis, and devices of presentation;
2. Initiating plans for coordinating statistical techniques within the department;
3. Reviewing, indexing, and distributing all statistical data coming from the department or elsewhere;
4. Replying to special requests for statistical data;
5. Maintaining a library of statistical reference and source data;
6. Providing direct services such as typing statistical tables and cartography;
7. Compiling regular (monthly, quarterly, annual, or biennial) and special statistical reports from machine tabulation and other sources;
8. Making special studies and statistical analyses.

The Statistical Consultation Service Section is developing a plan for a fully integrated field consultant service to local health departments on records and statistics. At present, its most important function is to provide technical services for the various bureaus or services.

This service primarily consists of the assignment of public health analysts or statisticians to the bureaus or services. The analysts are assigned after a review of program objectives with the bureau and service chiefs. The assignment may be for an indefinite period of time or for the completion of special projects. The analyst assigned to a bureau or service is responsible administratively to the chief of that bureau or service, but is professionally and technically responsible to the chief of the Bureau of Records and Statistics. As of July 1947, there were 23 persons in professional statistical positions (either statisticians or public health analysts) in the department and 13 were assigned to other bureaus or services. The aim is to achieve, through the coordination of the work of the public health analysts assigned to the various bureaus and services and through periodic program review with bureau and service chiefs, a fully integrated utilization of statistical resources in the department.

The plan to achieve this coordination includes the following:

1. Periodic program reviews by bureau and service chiefs and the chief of Bureau of Records and Statistics;
2. Periodic staff meetings of all statisticians and public health analysts to: (a) present progress reports on statistical activities in each division, (b) discuss current problems of interest to all professional personnel;
3. Supervisory conferences between public health analysts assigned to bureaus and services and the chief of Bureau of Records and Statistics;
4. Provision of consultative and other routine statistical services including tabulating, graphic presentation, etc.

At present there are also personnel working in cooperation with the Division of Local Health Services on records and evaluation of services. Plans are being made for the review of all other records, and the preparation of a departmental record manual is being considered.

The other five States with a centralized statistical division are in varying stages of development. These divisions have progressed to the extent that their classification as a centralized statistical agency is clear-cut both as to function and demonstrated activity. Three, and possibly four, of the States are handicapped because they lack a sufficient number of qualified statisticians. This has been reflected particularly in their inability to spend an adequate proportion of their time on analytical studies. Nearly all these divisions have younger personnel in training to assume greater professional responsibility.

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Content and Scope of Statistical Activities and the Role of the Statistician in Health Department Programs

In each of the States where field observations were made, discussions were held with the State health officer, division directors, and other key personnel concerning the conduct and organization of statistical activities within the department.

Without exception, the health officers stressed the increased number of reports and records that are developing, and the amount of personnel and time required to collect and process the data. The majority did not question the value of the reports and records, but expressed concern over the lack of staff time and skills to plan adequately in this field of activity. They felt that adequate planning and coordination would eliminate nonessential items, and could improve administration through increased utilization of the data collected. Several stated, however, that they were unable to see either the necessity for, or the potential utility of, much of the data that were being collected.

The discussions revealed differences of opinion on the content and scope of statistical activities, the role that the statistician is qualified to play in health department programs, and the optimum arrangements for organizing the statistical services. These opinions are of importance, for they reveal fundamental problems that must be considered in training all types of public health personnel, and in determining health department organization. They are presented under the major topics listed above.

There is widespread belief that, in an administrative organization such as a health department, statistics is primarily an administrative or "important clerical" function through which facts are collected, tabulated, and presented, perhaps in graphic form. According to this view, the statistician is employed to assume the responsibility for the detail of those operations. He may or may not participate in the determination of the data to be collected or in the formulation of policies regarding such collection. His responsibility is limited to accurate tabulation, summarization, and perhaps presentation of data in order that they may be analysed and interpreted by the individuals responsible for the operations of the functions involved. His role is that of an administrative assistant who is not responsible for thinking the programs through, but for administering the mechanics involved in obtaining needed factual data.

Others, and perhaps the majority, expressed the opinion that statistics is an important body of knowledge involving professional disciplines and techniques which are applicable to all aspects of public health administration and programming. Such disciplines and techniques are held to be important tools in the definition of health needs, in the formulation of policy, and in the evaluation of efforts to meet those needs. Statisticians, they assert, should be trained not only in statistics but in public health.

Other questions arose in the discussions on the content of statistics and the role of the statistician. There was agreement that central mechanical tabulating units were desirable if justified on the basis of the volume of data tabulated. Some individuals, however, believed that mechanical tabulation is primarily an administrative function, and as such is not necessarily a part of the functions of the statistician. They maintained that the prerequisites for its successful direction are mechanical knowledge of the machines and general administrative ability.

A larger number of persons felt that tabulating processes are an inherent part of the techniques available to the statistician, and that the supervisor of such a unit should be responsible to a statistician. One of the primary needs in most tabulating units, it was stated, is someone who can visualize the whole tabulating process with respect to any data that are to be tabulated, to prevent errors, and inefficiency by thorough analysis of procedures before tabulations are started.

Another controversial problem is the relationship between registration and analysis of vital records and other statistical functions. Some argue that registration is basically an administrative and legal function which requires interests and skills that are not necessarily statistical, for they require a different kind of training. In most State health departments the direction of registration is a full-time job in itself. The statistical work involved is secondary and can be handled either by statisticians in the bureau of vital records or by an independent statistical unit.

Others argue that the registration functions should be considered a part of the over-all statistical functions of the department. Although the registration of births, deaths, marriages, divorces, etc., is an administrative and legal procedure, it is also a procedure involving the collection of basic statistical data. Accuracy in definitions, uniformity in entries, completeness in coverage, and statistically accurate tabulations are essential if accurate basic indices of health are to be obtained. Furthermore, the data collected must be related to the population and other public health and statistical data.

Arguments Advanced Against a Centralized Organization of Statistical Activities

1. Statistical procedures in a health department are dependent on the specific health problems of the area and the efforts to solve those problems. The centralization of the statistical functions in one unit overemphasizes the importance of statistics, reducing effectiveness because of remoteness from the operational levels. In an organi-

zation where each division is responsible for its own statistical activities, the person or persons responsible for those activities can concentrate full time on the problems of one public health program. As time goes on, a detailed knowledge and understanding of the medical aspects of the program as well as of the needs and problems in administration may be acquired. The removal of the statistician from the operating division tends to circumvent the acquisition of this knowledge and reduce the effectiveness of the statistics.

2. The director of any specific program should have complete responsibility for the administration of that program except for broad policy formulation. He should be permitted to obtain and utilize such statistical data as he wishes, resources permitting, without interference by or reliance on other divisions, or other administrative philosophies.

3. Too large a proportion of the funds appropriated for public health is being expended for administrative "superstructures" at the expense of the personnel and services at operating levels. The creation of a centralized statistical unit would mean the addition of another "superstructure" necessitating greater drains on an already deficient budget. In addition, the establishment of such a unit would mean the employment of more nonmedical personnel who would try to establish more records and reports, requiring more "paper shuffling" and more equipment, reducing the funds and personnel available for the development of local health services.

4. In most organizations centralization has inherent disadvantages which may off-set its more popularly conceived advantages of efficiency, etc. These disadvantages are striking both from the point of view of the operating personnel and the statisticians who are interested primarily in getting "the job done." Statistics is an important program tool and, when need for it is recognized, plans for its use should be effected. In a health department with a centralized statistical unit, such plans may be delayed because other priorities pre-empt the equipment and services available. In addition, considerable time may be lost in writing memoranda and holding conferences. The problem may be further complicated by the need to deal with personnel who are not familiar with the details of the program under consideration.

A central tabulating unit has continual difficulty in establishing priorities, particularly when it is responsible for budgets, financial and pay-roll records, equipment inventories, etc. These operations frequently have the highest priority, and other important statistical operations must be deferred. Another factor is that in many instances special tabulations or trial runs of statistical data are desired and machine time in the central unit may not be available.

If a bureau, a division, or a specific program is responsible for its own statistical activities, these "bottlenecks" can be eliminated on a more logical basis, and in strict accordance with the director's opinion. He is not forced to exert pressures for, or to exaggerate the importance of, his activities at the expense of other health department activities. He is his own master within the resources available to him.

If the registration of vital records is considered a part of the statistical activities, the placement of that function in a centralized statistical unit is a mistake. The statistician vested with the responsibility for registration will find that he is absorbed in administrative and legal problems with little time left for an analytical and thoughtful approach to the statistical needs of the organization.

Arguments Advanced in Favor of a Centralized Statistical Organization

1. The primary goal of the public health services is to protect the health of the community at large; to achieve it, a generic and not a categorical approach must be made. In most areas of the United States there is an immense gap between the health needs and the financial and personnel resources available to meet those needs. The generic approach necessitates an over-all definition of those needs, and an evaluation of current efforts to meet them. Such definition and evaluation are difficult if not impossible to achieve without central coordination of statistical activities. Someone has to weave an over-all pattern from the data that are available. Most health officers have neither the time nor the skills necessary. A central statistical organization will facilitate this approach.

2. The correlation of statistical data collected by different program divisions is difficult because the personnel involved lack acquaintance with the data available throughout the department and ready access to those data. Such correlations are essential if health needs are to be defined and accomplishments evaluated. For example, much of the data collected by a division of maternal and child health should be related to data on births and deaths collected by the division of vital statistics. The data on nursing activities are of limited usefulness unless related specifically to the activities and problems of the services utilizing public health nurses. All these data should be related to the demographic characteristics of the area. This latter task is difficult because of the infrequency of the census. Special studies and many estimates are needed to establish current relationships. Uniform population indices should be used throughout the department. Central coordination and control are necessary to facilitate such correlations.

3. Most health officers are confronted continually with problems concerning record keeping and statistics. They are asked to approve new procedures which may overlap, conflict with, or duplicate the

procedures of other divisions. Complaints are received about existing procedures and burdens which they impose upon the organization. They receive requests for information which is not available or easily obtained from any single segment of the department. These problems can be met more effectively and easily if they can be referred to qualified personnel in a statistical office having department-wide functions. Such an office can be a coordinating mechanism which simplifies the task of administration.

4. In general, State health departments have insufficient resources to permit the employment of a qualified statistician in each program unit. In fact the budgets of many departments would not permit the employment of more than one statistician. The services of any statistician who is employed should therefore be available to all divisions in the department. The clerks who have the major responsibility for records and reports functions in the various programs, as well as the professional personnel, can profit from the technical direction and guidance that would thus be available. The clerks are competent usually for the immediate job they are doing, but lack the experience and training necessary for dynamic utilization of the statistical techniques that are applicable to the field of public health.

5. Experience indicates that the development of a progressive statistical program is more likely if the person in charge of planning statistical services is not a subordinate of individual program directors. He should be able to discuss the major problems of statistics, their application to a given field, and their relationships to over-all policy on an equal professional footing with other policy making staff members. Then major differences or disagreements on policy may be settled by the health officer. Such an arrangement will facilitate the accomplishment of valid results and serve as a bulwark against the vested interests of individual program directors or competition among them.

6. The statistical services such as coding, editing, tabulating, and graphic presentation can be performed more accurately, economically, and efficiently in a central unit than in widely dispersed units. In the first place, most divisions have an insufficient amount of such work to utilize fully the mechanical tabulating equipment that is needed. Pooling such needs facilitates justification for the rental of such equipment, and lends assurance of its fuller utilization. Secondly, qualified personnel are needed to direct and operate the equipment. If equipment is pooled, the amount of work may be sufficient to justify the employment of full-time trained personnel, and, in turn, should result in more accurate work, efficiently performed at less expense. Thirdly, in many health departments clerical operations in connection with pay rolls, central registers, administrative reporting, etc., could be performed with substantial financial savings through the

utilization of mechanical methods if tabulating equipment were available. Fourthly, the pooling of such operations removes many routine administrative problems from the responsibility of already overworked professional personnel throughout the department.

Summary

A study of statistical activities in the 48 State health departments as of October 1947, indicates that five basic patterns of organization have developed:

1. Eighteen do not have any central statistical organization with functions that cover the entire department, except for the functions concerning records of births, deaths, etc. Each major subdivision of the health department is responsible for all its record keeping, reporting, and statistical functions.
2. Fourteen have established a central tabulating unit as an integral part of the division of vital statistics, with the other statistical functions remaining the responsibility of the individual program directors.
3. Six have established a central tabulating unit apart from the division of vital statistics, with the other statistical functions remaining the responsibility of the individual program directors.
4. Four have placed all their statistical functions in an independent division, with a separate division responsible for the registration of vital statistics.
5. Six have centralized all statistical functions, including the registration of vital statistics, in one division or bureau.

During the study, opinions of many health officers and other key health department personnel were recorded concerning the pros and cons of the various forms of statistical organization. Many diverse views were expressed. One group held that, except for routine services such as tabulating, all statistical activity should be left to the responsibility of the directors of the various operating programs. This opinion was based primarily on the fear that if statistical functions are removed from the operating programs and placed in a central unit their adequacy and usefulness will be diminished. The majority felt that, in general, some form of a centralized statistical unit should be developed because it would facilitate:

1. Over-all analyses of the health needs of the area and the services being offered to meet those needs.
2. Elimination of duplicate and overlapping record keeping and statistical forms and procedures.
3. More economic and efficient administration.
4. More profitable utilization of statistical personnel.
5. Correlation of statistical data among the programs being administered and with other demographic information.

In conclusion, the consensus was that, although the form of organization for statistical activities may vary, depending on a variety of circumstances, coordination and not necessarily centralization of those activities on a department-wide basis is essential.

ACKNOWLEDGMENT

Appreciation is expressed for the cooperation received from the State health officers and members of their staffs in the conduct of this study. Especial appreciation is given to the State health officers for authorizing the use of specific data on organizational structures, and for the helpful advice and criticisms from them and others, including Dr. Halbert L. Dunn, Dr. Antonio Ciocco, and their staffs of the Public Health Service; Dr. Paul Densen of the Veterans' Administration, and Dr. W. Thurber Fales of the Baltimore Health Department.

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Sickness Absenteeism Among Industrial Workers

Third and Fourth Quarters of 1948

By W. M. Gafafer*

The accompanying data on 8-day or longer disabilities experienced by male employees during the third and fourth quarters of 1948 are derived from periodic reports from industrial sick benefit associations, company relief departments, and group health insurance plans. The reports cover approximately 200,000 male workers in various industries.

It will be seen in the table that the third quarter rates for 1948 and 1947 are similar. On the other hand, the 1948 fourth quarter rate (86.2) for sickness and nonindustrial injuries when compared with the corresponding rate for 1947 shows a decrease of 16 percent, the respiratory group of diseases being responsible for approximately half of this decrease. Attention is also directed to the 33-percent decrease in influenza and grippe which effects half of the decrease in the respiratory group of diseases.

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*Principal Statistician, Division of Industrial Hygiene, Bureau of State Services, Public Health Service. The report for first and second quarters of 1948, and for year 1947 appeared in Public Health Reports 63: 1489–1497 (1948).

The fourth-quarter respiratory rate of 27.3 is the lowest fourth-quarter rate yielded in the 10-years, 1939–48, being almost 40 percent below the 10-year mean of 45.0.

Number of absences per 1,000 males (annual basis) on account of sickness and nonindustrial injuries disabling for 8 consecutive calendar days or longer, by cause; experience of MALE employees in various industries, third and fourth quarters of 1948[1]

Cause[2]	Number of absences per 1,000 males (annual basis) beginning in specified period						
	Fourth quarter		Third quarter		Year		
	1948	1947	1948	1947	1948	1947	1943–47
Sickness and nonindustrial injuries	86.2	102.7	89.4	88.9	101.4	108.9	131.1
Nonindustrial injuries (169–195)	10.5	10.9	12.8	13.1	12.1	11.8	12.3
Sickness	75.7	91.8	76.6	75.8	89.3	97.1	118.8
Respiratory diseases	27.3	35.9	20.2	18.6	31.8	37.1	52.3
Tuberculosis of respiratory system (13)	.3	.6	.8	.6	.6	.6	.7
Influenza, grippe (33)	7.8	11.7	4.9	4.4	10.2	14.9	21.5
Bronchitis, acute and chronic (106)	5.3	6.6	4.0	3.1	5.8	5.6	8.6
Pneumonia, all forms (107–109)	4.0	3.9	2.3	2.3	4.3	3.8	5.9
Diseases of pharynx and tonsils (115b, 115c)	3.3	3.9	2.7	3.0	3.5	3.9	5.4
Other respiratory diseases (104, 105, 110–114)	6.6	9.2	5.5	5.2	7.4	8.3	10.2
Digestive diseases	15.2	15.4	16.0	16.9	16.5	16.8	18.0
Diseases of stomach except cancer (117, 118)	5.6	5.2	5.2	4.7	5.6	5.2	6.0
Diarrhea and enteritis (120)	1.9	1.7	2.6	2.4	2.1	2.2	2.4
Appendicitis (121)	3.2	3.3	3.5	3.9	3.4	3.6	4.0
Hernia (122a)	1.6	1.9	2.0	2.5	2.3	2.3	2.3
Other digestive diseases (115a, 115d, 116, 122b–129)	2.9	3.3	2.7	3.4	3.1	3.5	3.3
Nonrespiratory-nondigestive diseases	31.0	37.2	37.7	37.0	37.9	39.4	43.6
Infectious and parasitic diseases (1–12, 14–24, 26–29, 31, 32, 34–44)[3]	1.6	1.8	2.2	2.8	2.5	2.5	2.7
Rheumatism, acute and chronic (58, 59)	3.1	4.0	3.5	3.1	4.1	3.8	5.2
Neurasthenia and the like (part of 84d)	1.4	1.4	1.6	1.5	1.6	1.7	2.0
Neuralgia, neuritis, sciatica (87b)	2.1	2.2	2.1	2.3	2.4	2.4	3.1
Other diseases of nervous system (80–85, 87, except part of 84d, and 87b)	1.0	1.7	1.8	1.8	1.5	1.7	1.9
Diseases of heart and arteries, and nephritis 90–99, 102, 130–132)	5.4	6.4	6.0	6.0	6.5	6.9	7.0
Other diseases of genitourinary system (133–138)	2.7	3.1	3.2	2.9	3.0	3.1	3.2
Diseases of skin (151–153)	3.1	3.8	3.7	3.8	3.3	3.5	3.5
Diseases of organs of movement except diseases of joints (156b)	2.2	2.7	2.6	2.4	2.8	2.9	3.5
All other diseases (45–57, 60–79, 88, 89, 100, 101, 103, 154, 155, 156a, 157, 162)	8.4	10.1	11.0	10.4	10.2	10.9	11.5
Ill-defined and unknown causes (200)	2.2	3.3	2.7	3.3	3.1	3.8	4.9
Average number of males	199,931	195,496	202,820	194,801	198,837	194,243	1,116,599

[1] Industrial injuries and venereal diseases are not included.
[2] Numbers in parentheses are disease title numbers from International List of Causes of Death, 1939.
[3] Exclusive of influenza and grippe, respiratory tuberculosis, and venereal diseases.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED APRIL 30, 1949

A slight increase in the incidence of measles was recorded for the country as a whole. A total of 29,437 cases was reported, as compared with 29,165 last week and a 5-year (1944–48) median of 28,426. The largest increase (from 4,059 cases last week to 4,619 currently) was reported in the East North Central area, and the largest decrease (from 1,947 to 1,323), in the West North Central area. The 8 States reporting more than 829 cases each and showing increases are as follows (last week's figures in parentheses): Pennsylvania 2,745 (2,334), New Jersey 2,312 (2,213), Wisconsin 2,004 (1,889), California 1,631 (1,261), Connecticut 1,535 (1,418), Ohio 1,384 (921), North Carolina 1,205 (967), Massachusetts 954 (748). The total reported for the year to date is 402,317 cases (more than for a corresponding period since 1944, 428,804), as compared with a 5-year median of 806,597.

A total of 2,074 cases of influenza was reported, as compared with 2,288 last week and 1,594 for the 5-year median. States reporting currently more than 101 cases (last week's figures in parentheses) are as follows: Maine 304 (last week 3, next earlier week 101), South Carolina 296 (623), Alabama 183 (75), Texas 822 (931).

Of 68 cases of poliomyelitis reported (last week 45, 5-year median 28), only 2 States reported more than 3 cases—Texas 19 (last week 7) and California 14 (last week 5). The total reported since March 19 (average week of lowest seasonal incidence) is 293, as compared with 214 for the same period last year and a 5-year median of 162.

During the week 5 cases of smallpox were reported, 1 each in Kentucky (last week 1), Oklahoma, Colorado, New Mexico (last week 1), and Arizona. Of 6 cases of Rocky Mountain spotted fever, 2 occurred in California and 1 each in Virginia, Oklahoma, Montana, and Wyoming. One case of "Virus X" infection was reported in Idaho.

A total of 9,531 deaths was recorded during the week in 94 large cities in the United States, as compared with 9,523 last week, 9,077 and 9,621, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 9,021. For the first 17 weeks of the year to date the total is 166,421, as compared with 169,914 for the corresponding period last year.

Telegraphic case reports from State health officers for week ended April 30, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [e]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	...	...	304	440	1	12	...	...	9	...	...	...	19	...
New Hampshire	...	...	3	155	1	7	...	...	17	...	...	...	5	...
Vermont	...	...	...	223	...	6	...	...	5	...	...	...	2	...
Massachusetts	14	1	...	954	...	...	...	...	154	...	...	1	60	...
Rhode Island	...	...	...	86	...	6	...	...	4	...	...	1	1	...
Connecticut	4	...	2	1,535	1	45	2	...	29	...	...	1	11	...
MIDDLE ATLANTIC														
New York	11	1	[e] 2	2,322	6	223	2	...	[d] 161	...	...	1	91	5
New Jersey	3	1	4	2.312	2	57	1	...	110	...	...	...	45	1
Pennsylvania	1	...	(e)	2,745	8	...	1	...	264	...	...	2	94	...
EAST NORTH CENTRAL														
Ohio	10	...	2	1,384	5	70	1	...	243	...	...	4	57	18
Indiana	8	...	...	229	...	19	2	...	54	...	...	...	11	15
Illinois	...	...	10	173	3	162	3	...	107	...	...	1	41	5
Michigan [e]	...	...	2	829	5	50	1	...	320	...	...	1	33	8
Wisconsin	2	...	31	2,004	3	4	...	...	33	...	...	...	21	...
WEST NORTH CENTRAL														
Minnesota	2	1	...	199	3	9	...	...	28	...	...	...	...	...
Iowa	...	1	...	96	2	2	1	...	11	...	...	1	6	6
Missouri	1	...	3	296	1	38	...	...	25	...	...	...	4	...
North Dakota	...	2	3	26	...	...	...	...	1	...	...	...	...	...
South Dakota	1	...	...	35	...	...	...	...	...	...	...	...	...	...
Nebraska	...	...	2	173	...	2	...	...	8	...	...	...	...	...
Kansas	1	...	...	498	3	10	...	...	9	...	...	3	1	...
SOUTH ATLANTIC														
Delaware	...	...	...	68	...	...	...	...	6	...	...	...	4	...
Maryland [e]	...	...	...	369	1	45	...	...	[d] 44	...	...	...	10	...
District of Columbia	2	...	...	141	2	14	...	...	7	...	...	...	1	...
Virginia	3	1	101	841	2	...	...	1	9	...	...	6	33	1
West Virginia	...	...	26	78	...	7	[e] 3	...	15	...	...	...	14	...
North Carolina	2	...	...	1,205	5	...	3	...	11	...	...	...	27	...
South Carolina	2	1	296	529	...	89	...	...	2	...	...	...	25	2
Georgia	1	1	13	657	4	69	...	...	16	...	2	1	...	7
Florida	2	...	10	182	...	6	[e] 2	...	9	...	1	2	7	2

EAST SOUTH CENTRAL														
Kentucky	4		3	489	3	28	1		23	1		1	11	19
Tennessee	2	1	42	364	1	34			14		2		9	
Alabama	2		183	629	1	128			4		1	1	15	15
Mississippi [a]	3		21	93	1	35	1		3		1	2	8	
WEST SOUTH CENTRAL														
Arkansas	3		47	597	1	43			1		10		19	4
Louisiana			5	28	7	37	2		5		1	4		1
Oklahoma	4		31	446	1	22		1	6	1	1		1	2
Texas	13	1	822	2 310	6	249	19		47		2	3	121	22
MOUNTAIN														
Montana			3	183				1	20		1		8	
Idaho	2		7	201		8	2		[d] 14			1	1	
Wyoming				15		20	1	1	1			1		
Colorado			12	390	2	19			13	1		2		
New Mexico			1	145		34			8	1		1	6	
Arizona	1		53	137		12			7	1			6	
Utah [a]				134		1	2		6		2		13	
Nevada														
PACIFIC														
Washington	3			563	2	6	2		26				11	
Oregon			20	298	2	37	2		15		—		34	
California	3		10	1 631	2	31	14	2	[d] 97			1	84	4
Total	110	12	2,074	29 437	8"	1 696	68	6	2,021	5	24	42	970	
Median, 1944-48	206	9	1 594	28,426	126		28	5	3 624	8	11	65	1 913	
Year to date 17 weeks	2 769	138	65,397	402,317	1 451	39 299	1 215	28	46,112	37	436	722	16,961	
Median, 1944-48	4 633	142	181 831	306 597	3 075		580	16	59 920	167	308	845	36,738	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept 4	(3"th) Sept 18		(11th) Mar 19		(32nd) Aug 14	(35th) Sept 4		(11th) Mar 19	(39th) Oct 2	
Since seasonal low week	7 883		101 66"	454 "10	2 295		293		68 810	52		262	26,994	
Median, 1943-48 [b]	12,199		319 765	341 543	4 579		182		98 491	243		370	64 127	

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[a] Period ended earlier than Saturday

[b] The median of the 5 preceding corresponding periods for poliomyelitis and typhoid fever the corresponding periods are 1944-45 to 1948-49, inclusive

[c] New York City and Philadelphia only respectively

[d] Including cases reported as streptococcal infection and septic sore throat

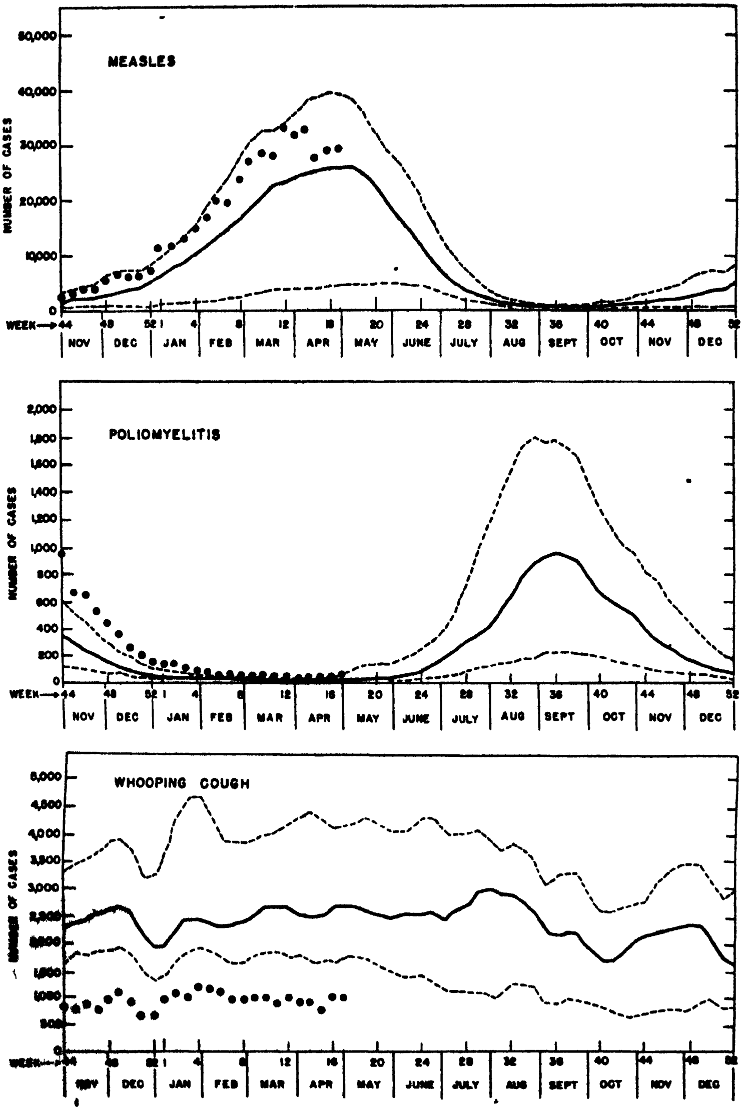
[e] Including paratyphoid fever currently reported separately as follows Rhode Island 1, Michigan 1 Kansas 1, Georgia 1, Florida 2, Louisiana 1, Colorado 2. Salmonella infections, not included, were reported as follows Massachusetts 1 New York 1

Alaska. Influenza 7 measles 1 streptococcal sore throat 1

Territory of Hawaii Measles 167

Communicable Disease Charts

All reporting States, November 1948 through April 30, 1949



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is a median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—January 1949.—During the month of January 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence[1]									
	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chagas disease						1				1
Chickenpox	21		2				3		26	
Diphtheria	4	1							4	1
Dysentery:										
Amebic	1		1		1		3		6	
Bacillary					1				1	
Hepatitis, infectious							1		1	
Malaria[2]	6	1	2		10		95	2	113	3
Measles					1				1	
Meningitis	3			1	1				4	1
Mumps	2		1		1				4	
Pneumonia		6			12	1		1	[3] 12	8
Poliomyelitis					1		2		3	
Tetanus	1								1	
Tuberculosis		22		6	5	3		2	[3] 5	38
Typhoid fever	1		1				3	1	5	1
Whooping cough								1	([3])	1
Yaws							1		1	

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[1] If place of infection is known, cases are so listed instead of by residence.
[2] 3 recurrent cases.
[3] Reported in the Canal Zone only.

Virgin Islands

Notifiable diseases—January-March 1949.—During the months of January, February, and March, 1949, cases of certain notifiable diseases were reported in the Virgin Islands of the United States as follows:

Disease	January	February	March	Disease	January	February	March
Cancer		2	1	Ophthalmia	1		
Chickenpox	6	5	15	Pneumonia (lobar)		2	1
Gonorrhea	22	11	13	Septic sore throat	3		
Hookworm disease	2			Syphilis	13	14	9
Meningitis			4				

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 9, 1949.—During the week ended April 9, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		24	3	158	502	21	28	48	250	1,034
Diphtheria				4	2	1		1		8
Dysentery, bacillary				1					1	2
German measles				419	144		211	35	16	825
Influenza		88			3	5				96
Measles		271	58	98	171	250	173	322	281	1,624
Meningitis, meningococcal				1		1				2
Mumps		116	17	76	278	40	16	11	132	686
Poliomyelitis				1	1	1				3
Scarlet fever		7	1	109	103	3		9	14	246
Tuberculosis (all forms)		13	8	93	40	24	17	31	49	275
Typhoid and paratyphoid fever			1	6	1				1	9
Undulant fever					2					2
Venereal diseases:										
Gonorrhea		7	6	78	68	26	22	24	56	287
Syphilis		3	12	55	46	11	4	4	20	155
Whooping cough		30		85	33	16	1	1		166

JAPAN

Notifiable diseases—4 weeks ended March 26, 1949, and accumulated totals for the year to date.—For the 4 weeks ended March 26, 1949, and for the year to date, certain notifiable diseases were reported in Japan as follows:

Disease	4 weeks ended March 26, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	1,473	122	4,957	513
Dysentery, unspecified	211	47	507	140
Encephalitis, Japanese "B"		1	2	1
Gonorrhea	13,906		43,185	
Influenza	245		636	
Malaria	110	3	309	8
Measles	16,167		31,586	
Meningitis, epidemic	163	41	380	94
Paratyphoid fever	96	5	429	13
Pneumonia	16,547		46,506	
Scarlet fever	320	2	1,158	19
Smallpox	13	1	16	1
Syphilis	17,033		49,517	
Tuberculosis	32,802		95,311	
Typhoid fever	257	45	1,155	136
Typhus fever	6	1	60	2
Whooping cough	5,535		17,135	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

FINLAND

Notifiable diseases—February 1949.—During the month of February 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	7	Paratyphoid fever	54
Diphtheria	143	Poliomyelitis	3
Dysentery	15	Scarlet fever	270
Gonorrhea	674	Syphilis	110
Malaria	1	Typhoid fever	34

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

NOTE.—Except in cases of unusual incidence, only those places are included which had not previously reported any of the above-mentioned diseases, except yellow fever, during recent months. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—During the week ended April 16, 1949, 265 cases of cholera, with 74 deaths, were reported in Calcutta, India.

Plague

Basutoland.—During the week ended February 5, 1949, 1 fatal case of plague was reported in Mohale's Hoek District, Basutoland.

Belgian Congo—Stanleyville Province.—During the week ended April 9, 1949, 1 fatal case of plague was reported in the village of Mange, west of Blukwa, Stanleyville Province, Belgian Congo.

China—Chekiang Province—Wenchow.—On April 5–6, 1949, 2 cases of plague were reported in Wenchow, Chekiang Province, China.

India.—For the week ended April 16, 1949, plague was reported in certain cities in India as follows: Calcutta 12 cases, Cawnpore 20 cases, with 2 deaths.

Indochina (French)—Cochinchina.—During the week ended April 9, 1949, 5 fatal cases of plague were reported in Cochinchina, French Indochina. The following week (week ended April 16), 1 fatal case was reported in this State.

Burma—Moulmein.—During the week ended April 9, 1949, 2 cases of plague were reported in Moulmein, Burma.

Smallpox

Gambia—Bathurst.—During the period February 5–April 16, 1949, 35 cases of smallpox were reported in Bathurst, Gambia.

Great Britain—England.—Information dated April 28, 1949, states that 11 confirmed cases of smallpox, 5 of them fatal, occurred among the passengers who were on board the steamship *Mooltan* when she arrived at the Port of London on April 2, with the body of a man aboard who died of the disease at sea. These cases are reported to have occurred at the following places: Port of London 1 (fatal), Paddington 2 (1 fatal), St. Pancras 1, Isle of Axholme 1 (fatal), Liverpool 1, Wembley 1 (fatal), Sutton and Cheam 1, Torquay 1 (fatal), Aylesbury 1, Richmond 1. No confirmed case has been reported in any person who was not on board the vessel, but contacts are still under observation, and the Ministry of Health is said to believe there is still some possibility of cases appearing at Liverpool, Richmond, and Aylesbury.

India—Bombay.—For the week ended April 16, 1949, 168 cases of smallpox with 38 deaths were reported in Bombay, India.

Indochina (French)—Laos State.—During the week ended April 9, 1949, 54 cases of smallpox, with 12 deaths, were reported in Luang Prabang Province, Laos State, French Indochina.

Java—Batavia.—For the week ended April 16, 1949, 205 cases of smallpox were reported in Batavia, Java.

Korea.—During the week ended March 19, 1949, 409 cases of smallpox, with 45 deaths, were reported in Korea (period of occurrence not specified).

Republic of the Philippines—Mindoro Island.—During the week ended January 29, 1949, 2 cases of smallpox were reported in Mindoro Island, Philippine Islands.

Typhus Fever

Egypt.—During the week ended April 2, 1949, 40 cases of typhus fever were reported in Egypt.

Ethiopia.—Delayed report: During the period December 1–20, 1948, 50 cases of typhus fever were reported in Ethiopia, 45 of which were reported from Shoa Province.

Korea.—During the week ended March 19, 1949, 102 cases of typhus fever with 9 deaths were reported in Korea (period of occurrence not specified).

DEATHS DURING WEEK ENDED APR. 23, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Apr. 23, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,521	9,226
Median for 3 prior years	9,502	
Total deaths, first 16 weeks of year	156,890	160,837
Deaths under 1 year of age	638	662
Median for 3 prior years	662	
Deaths under 1 year of age, first 16 weeks of year	10,553	11,079
Data from industrial insurance companies:		
Policies in force	70,482,786	71,079,535
Number of death claims	13,524	13,134
Death claims per 1,000 policies in force, annual rate	10.0	9.7
Death claims per 1,000 policies, first 16 weeks of year, annual rate	9.7	10.5

Notifiable Diseases, Fourth Quarter, 1948 [1]

The figures in the following table are the totals of the monthly morbidity reports received from State health authorities for October, November, and December, 1948. These reports are preliminary and the figures are more or less incomplete and subject to correction by final reports. The figures may be assumed to represent the civilian population only, although in some instances a few cases in the military population may be included. The comparisons made are with similar preliminary reports; but, owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The list of diseases required to be reported is not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these and other deficiencies inherent in morbidity reporting, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic distribution of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for October, November, and December 1948

Division and State	Anthrax	Chickenpox	Conjunctivitis [2]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria [3]	Measles*	Meningitis, meningococcal*	Mumps	Ophthalmia	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	--------	680	--------	8	--------	1	--------	--------	35	--------	10	--------	2,000	3	368	--------	--------	120
New Hampshire	--------	368	--------	--------	--------	--------	--------	--------	6	--------	15	--------	329	3	280	--------	--------	21
Vermont	--------	1,123	--------	2	--------	--------	--------	--------	225	--------	2	--------	1,181	--------	211	--------	--------	14
Massachusetts	1	5,384	--------	113	1	10	--------	10	189	--------	--------	2	8,122	18	--------	[4] 93	--------	[5] 282
Rhode Island	--------	255	--------	5	--------	3	--------	--------	4	--------	1	1	275	5	453	--------	--------	37
Connecticut	--------	2,494	31	4	5	2	--------	3	52	1	16	--------	524	22	1,775	--------	--------	479
MIDDLE ATLANTIC																		
New York	1	4,480	24	74	103	202	--------	8	[6] 71	[6] 31	[6] 35	17	3,136	64	[6] 431	[4] 5	--------	2,320
New Jersey	1	6,762	--------	17	9	1	--------	--------	162	--------	34	9	977	26	1,715	[4] 2	--------	686
Pennsylvania	3	5,831	--------	97	6	9	--------	5	--------	--------	35	--------	2,580	57	1,258	--------	--------	967
EAST NORTH CENTRAL																		
Ohio	--------	4,023	3	97	10	22	6	--------	85	--------	21	--------	399	40	753	[4] 123	--------	537
Indiana	--------	761	--------	130	11	1	--------	9	9	--------	136	--------	230	10	251	--------	--------	167
Illinois	--------	4,395	12	17	105	49	--------	9	106	1	42	[7] 4	261	53	1,479	21	--------	1,136
Michigan	--------	4,349	39	47	124	68	--------	--------	120	12	25	5	2,912	25	1,456	[4] 1	--------	469
Wisconsin	--------	6,270	--------	4	5	--------	--------	1	203	--------	117	--------	2,289	19	1,869	--------	--------	[6] 66

WEST NORTH CENTRAL																		
Minnesota		637	107	25	13	12	2	2		2	5	20	92	19				73
Iowa		1 010		14	3			4	1				133	14	706			27
Missouri		722		51			18	1			40	3	611	14	206			178
North Dakota		302	1	12				6			7		415	3				193
South Dakota		193		5				9			1		21	3	30			10
Nebraska		226		11	1						115		65	2	297			25
Kansas		819	7	30		4		2	21		28	1	247	6	312			128
SOUTH ATLANTIC																		
Delaware		33		5									23	1	4			5
Maryland		568		32	2	5	46	2	28		16	1	2 217	16	134	2		303
District of Columbia		123		8	3	54							89	2	27			167
Virginia		908		186	3		1 177	4			4 146	5	1 619	21	492		1	563
West Virginia		320		60		4		1	4		358		133	17	98			44
North Carolina				177	9	14		2				9	640	15				
South Carolina		237		282	22	97		7	32	503	3 212	487	80	8	161	[4] 11	96	798
Georgia		218	5	277	6	80	4	2		746	156	27	224	12	414		18	447
Florida		132		136	55	26	16	3	16	1 305	65	21	373	18	198	[4] 8	3	189
EAST SOUTH CENTRAL																		
Kentucky	1	381	3	177	3	40			60		17	7	586	26	152			292
Tennessee		476		141	72	16	6	6	23	4	223	10	317	14	366	[4] 10	4	445
Alabama		356		372	2				21		210	35	603	21	102		1	374
Mississippi				109	30	59		3		1 404		28	136	8		[4] 8		221
WEST SOUTH CENTRAL																		
Arkansas		410		62	76	29	629		18	5	1 293	101	867	8	174	2		305
Louisiana		64		57	241	1		3		187	45	3	176	17	73	2	1	314
Oklahoma		378		54	10	7	19	2	13	1	540	41	277	8	296		5	194
Texas				285	143	6,098	3 438					775	4 947	51		[4] 21		1,619
MOUNTAIN																		
Montana		1 029	32			1			27		47		90	4	116			36
Idaho		324	6	9	2				53		184		262	4	325			101
Wyoming		443	2	4					4		29		449	1	150			21
Colorado		1 109		22	3	36			41		402	1	954	6	375			242
New Mexico	1	149	3	20	7	19	19		14		21	1	387	2	109	2	1	141
Arizona	1	222		50	24	165	11	1	48		1 208	4	588	6	72	[4] 2	2	199
Utah		1 039		37	1	2			29		42	1	1 522	3	242			41
Nevada		26	6				5		25				45		5		1	9
PACIFIC																		
Washington	1	2,183	39	23	4		90		127		92		1 221	19	1 473			206
Oregon			2	23	51	26	3	1				1	1 730	5				219
California	1	5,146		78	89	190		11	744		124	6	2,574	68	5 853	1		[4] 289
Total	11	67 358	322	3,369	1 254	7 353	5,489	117	2,616	4 202	13 115	1 626	49 928	787	25 261	314	133	15,671
Fourth quarter 1947	25	50 129	543	4 359	831	4 725	2,143	153	2,017	3 502	32,724	2,893	31 642	701	27 665	291	324	17 316
Median 1943-47	12	61 310	224	5 458	867	5,898	1 897	145	2,316	3 812	38,579	9 911	25,449	1 357	25,042	365	799	23,357
Alaska		86							11		17		1	4	55			6
Hawaii Territory		265	5	1	3	14			83	5	6	3	2 286		363			[5] 19
Panama Canal Zone [5]		35		4	14	18			2			496	11	11	19			[6] 63

See footnotes on page 656

Consolidated monthly State morbidity reports for October, November, and December 1948—Conitnued

Division and State	Poliomyelitis*	Rabies in man	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Smallpox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever	Paratyphoid fever	Typhus fever, endemic	Undulant fever	Vincent's infection	Whooping Cough*
NEW ENGLAND																			
Maine	11				207	17					110	99		2	4		1	3	197
New Hampshire	2				70	28					52							12	87
Vermont	1				91	2								2	1			2	141
Massachusetts	38				1,410	26		3	2	6	684	636		6	15		3		766
Rhode Island	2		33		85	10		2		2	131	118		4	6		2	6	72
Connecticut	35				301	67		6		7	414	376		3	[12] 3		18		95
MIDDLE ATLANTIC																			
New York	444				[10] 1,573	(11)		9		42	3,542	3,353		38	[12] 20	8	50		1,427
New Jersey	222				621	38		4		3	779		1	9			18		534
Pennsylvania	236		369	2	796					3	1,133		5	34	[12] 8		20		1,138
EAST NORTH CENTRAL																			
Ohio	268		32		2,147	4		3	1	1			16	38	6		38	4	426
Indiana	99	1	6		473	3		2			481	460	36	15	1		13	3	149
Illinois	327		18	1	1,219	16		2	1	1	1,686	1,572	27	18	1		119	38	369
Michigan	266		129		1,609	160		3		1	1,681		3	17	[12] 83		61		325
Wisconsin	254				554	39					476			2			62		297
WEST NORTH CENTRAL																			
Minnesota	561		16		539	49		2			795		2	6	[12] 1		57		45
Iowa	603				296	3					55			5			80		124
Missouri	113		16		269	13		2	244		719		18	20	1	1	17		72
North Dakota	30		1		119		1		3		82	78		2			2	7	87
South Dakota	717				31			1	15		86		1		1		17	1	1
Nebraska	191		1		178		1				86		1	1			16		20
Kansas	84				310	7		3	1		244	239	5	5	1		18	19	98
SOUTH ATLANTIC																			
Delaware	10				25						93	92		2			1		2
Maryland	48		24	2	187	19		1			703	373	4	13	1	1	13	4	190
District of Columbia	51				69					1			1		6				42
Virginia	154			4	200	568		1			939	924	13	26	3	1	13		244

West Virginia	49		4		209	9					545	539		22			1		212
North Carolina	296			8	455	6					958	933	17	18	3	22	4		196
South Carolina	66		56	1	97	1,613		1			122		5	10	6	7	5		190
Georgia	48		19	4	377	62		9			704	673	20	29	10	64	22	22	37
Florida	81	1			102	60		36	34		661	661	6	21	[12] 46	58	19	28	62
EAST SOUTH CENTRAL																			
Kentucky	45	2	8		601	17		1	41		506	501	3	14	3	7	1	4	226
Tennessee	99	2	11	1	703	113		11	1		1,599		12	37	1	5	10	50	172
Alabama	49			4	298			12			633		7	13	3	38	9		71
Mississippi	31		10		131			2			717	702	11	24		9	12		36
WEST SOUTH CENTRAL																			
Arkansas	22		5		88	260		10	34		579	573	19	22	2	3	8		130
Louisiana	44	1	8		96	12		6			784	752	10	33	4	15	9		15
Oklahoma	65			5	227	50			100		497	491	19	12	[13] 2		27		28
Texas	309				312	740			15		4,202		8	33	23	81	126		814
MOUNTAIN																			
Montana	22		1		162	19	1		6	3	125	120	2	4					58
Idaho	25		15		65	93	4	1	28		64			1			9	6	34
Wyoming	16		1		38	3					21	17	8	1			1	8	10
Colorado	30		17		154	69		1			204		4	11	4		35	8	114
New Mexico	20		5		88	7			14		[13] 290	[13] 275	2	76					37
Arizona	51		26		41	192			76		560	545	1	11	2		2		50
Utah	[13] 149		18		69	2			1		[13] 45	[13] 43	[13] 16		[13] 5		[13] 7		126
Nevada	15				30	6			1		12							1	2
PACIFIC																			
Washington	180		97		399	31					725		1	4	[13] 6		5	45	102
Oregon	103		12	1	233	51		1	5		189	174		7	2		1		126
California	2,429		127	[13] 2	958	187		9	20	8	2,138	1,989		40	43	2	34		606
Total	9,012	7	1,085	35	19,522	4,671	7	144	643	78	31,847	17,308	304	710	[13] 327	317	986	269	10,349
Fourth quarter 1947	3,335	5	916	60	19,273	4,034	20	107	348	110	30,957	17,533	252	717	273	332	1,306	560	32,131
Median 1943-47	4,008	6	[14] 1,021	32	32,260	2,441	67	108	443	67	28,091	16,267	252	892	184	1,494	1,262	576	27,460
Alaska			10		26	19					117	109						2	3
Hawaii Territory			4		4	1		4	2		230	218			1	10	1		18
Panama Canal Zone [8]	8							2			[9] 9			5		1	1		[9] 2

See footnotes on page 656.

Footnotes for Table on Pages 652 to 655

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all the States; paratyphoid fever in all except 6 States. Syphilis is reportable in all the States and the District of Columbia but is not included in the table. Some States have increased and some have reduced the list of reportable diseases since the latest published compilation of reportable diseases (PUBLIC HEALTH REPORTS 59:317-340) (Mar. 10, 1944. Reprint No. 2544).

[1] For reports for first, second, and third quarters of 1948 see pp. 950, 1,424, and 224 of the PUBLIC HEALTH REPORTS for July 16 and October 29, 1948, and February 18, 1949, respectively.

[2] Includes cases of kerato and suppurative conjunctivitis and of pink eye.
[3] In a few States practically all cases contracted outside the United States.
[4] Reported as ophthalmia neonatorum.
[5] Lobar pneumonia only.
[6] New York City only.
[7] Does not include cases artificially induced.
[8] Includes the cities of Colon and Panama.
[9] In the Canal Zone only.
[10] Includes septic sore throat.
[11] Included in scarlet fever.
[12] Includes cases reported as salmonella infection.
[13] Includes nonresident cases.
[14] 3-year (1945-47) median.

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States; last year's figures in parentheses (where no figures are given, no cases were reported last year):

Actinomycosis: Maine 1, Michigan 2, Minnesota 2 (1), Tennessee 1.
Botulism: Minnesota 1, Colorado 5 (1), California 3.
Cancer: North Dakota 206, Kansas 1,194, South Carolina 225, Georgia 55, Florida 428, Kentucky 18, Tennessee 1,019, Alabama 896, Arkansas 154, Louisiana 520, Montana 253, Idaho 164, New Mexico 150, Utah 46 (includes nonresidents), Nevada 3.
Coccidioidomycosis: Kansas 1, Arizona 9 (2), California 18 (16).
Dengue: South Carolina 1 (2), Mississippi 1, Texas 4 (4).
Dermatitis: New Hampshire 1, Missouri 9, Kentucky 21 (mycotic dermatitis), Arkansas 1.
Diarrhea: Rhode Island 1, Connecticut 5, New York 70 (26), Pennsylvania 120 (23), includes gastroenteritis, Ohio 340 (130), includes enteritis, Indiana 1 enteritis, Illinois 17 (8), Michigan 31 (5), Iowa 1, Kansas 48 (40), includes enteritis, Maryland 12 (5), South Carolina 2,130 (1,831), Florida 35 (34), Kentucky 14 (36), includes gastroenteritis, Oklahoma 2 (2), Idaho 73 gastroenteritis, Colorado 4 (1), includes enteritis, New Mexico 96 (68), California 35 (32), Alaska 23, includes enteritis.
Dog bite: Massachusetts 2,213, Illinois (all animal bites) 2,601 (2,638), Michigan 1,613 (1,624), Arkansas (all animal bites) 112 (125).
Encephalitis (other forms): Maine 1, Connecticut 2, New York 3, Ohio 2, Michigan 9, Nebraska 1, Maryland 4, Florida 21, Idaho 2, Colorado 2, New Mexico 6, Washington 7.
Erysipelas: New Hampshire 1, Connecticut 5, Ohio 3, Indiana 1, Illinois 70, Michigan 28, Wisconsin 11, South Dakota 2, Kansas 1, Maryland 7, Florida 13, Kentucky 3, Tennessee 8, Arkansas 5, Louisiana 1, Montana 1, Idaho 2, Colorado 6, Nevada 1, Oregon 7, Hawaii Territory 2.
Food poisoning: Maine 1, New York 434, New Jersey 3 (2), Ohio 8 (13), Illinois (includes cases reported as food infection) 48 (8), Minnesota 146 (54), Kansas 1, Florida 13, Louisiana 4 (6), Idaho 2 (1), Colorado 61 (2), New Mexico 13, Washington 41 (55), Oregon 11 (12), California 256 (166).
Granuloma inguinale: Florida 251 (72), Tennessee 13 (7), Mississippi 18 (71), Louisiana 38 (57), Idaho 1.
Impetigo contagiosa: Vermont 1, Rhode Island 1, New York 36, Ohio 85 (23), Indiana 10 (36), Illinois 13 (17), Michigan 637 (668), Missouri 32 (17), North Dakota 4 (2), Nebraska 9 (4), Kansas 17 (14), Maryland 1, Kentucky 14 (24), Montana 39 (9), Idaho 21 (19), Wyoming 7 (12), Colorado 8 (25), Nevada 26 (59), Washington 284 (521), Alaska 3 (1), Hawaii Territory 14 (37).
Jaundice (including hepatitis and Weil's disease): Maine 7 (3), New York 52 (99), Pennsylvania 19 (23), Ohio 2, Illinois 8 (9), Minnesota 4 (15), Maryland 4, South Carolina 2 (8), Florida 3 (1), Kentucky 18 (4), Tennessee 2 (8), Louisiana 1, Idaho 6 (6), Arizona 6, Washington 2, Oregon 11 (17), California 46 (39), Hawaii Territory 3 (2), Panama Canal Zone 4.
Leprosy: New York 2 (4), Florida 3 (2), Louisiana 1 (1), Texas 2 (2), Arizona 1, California 2 (1), Hawaii Territory 7 (6).
Lymphogranuloma venereum: Florida 58 (31), Kentucky 1, Tennessee 13 (15), Mississippi 23, Louisiana 15 (34), Utah (nonresident) 1.
Mononucleosis: Connecticut 23, Michigan 42, Minnesota 69, Maryland 11, South Carolina 4, Kentucky 7, Tennessee 10, Idaho 1.
Pellagra: Virginia 1, South Carolina 96, Georgia 18, Florida 3, Tennessee 4, Alabama 1, Louisiana 1, Oklahoma 5, New Mexico 1, Arizona 2, Nevada 1.
Psittacosis: Pennsylvania 1, Alabama 1, Washington 1, California 6 (4).
Puerperal septicemia: Mississippi 1, Arkansas 1.
Rabies in animals: New York 143 (191), Pennsylvania 27, Ohio 197 (152), Indiana 162 (72), Illinois 18 (16), Michigan 63 (55), Wisconsin 1, Minnesota 1 (1), Iowa 9, Kansas 6 (13), Virginia 29, South Carolina 42 (33), Georgia 85, Florida 75 (110), Kentucky 152, Alabama 67 (88), Arkansas 22 (24), Louisiana 4 (6), Oklahoma 37, Texas 350 (208), Arizona 4 (50 delayed reports), Utah 1 (1), California 51 (90).
Rat bite fever: Ohio 1.
Relapsing fever: Texas 15 (15), California 1 (5).
Rickettsialpox: New York 31.
Ringworm disease (including ringworm of the scalp): Connecticut 11, Pennsylvania 31 (1,149), Ohio 36 (29), Indiana 22, Illinois 849 (346), Michigan 546 (638), Minnesota 13 (12), Iowa 18 (126), Missouri 9 (12), Kansas 42 (7), Maryland 1, Georgia 35, Kentucky 18 (26), Montana 3 (2), Idaho 17 (20), New Mexico 6, Utah 10 (105), Nevada 1, Washington 393 (410), Oregon 3.
Scabies: Rhode Island 14 (4), Pennsylvania 109 (134), Ohio 37 (53), Indiana 2 (3), Michigan 393 (378), Missouri 23 (20), Kansas 17 (39), Maryland 2, Kentucky 38 (37), Montana 43 (24), Idaho 51 (59), Wyoming 9 (15), Nevada 2 (11), Alaska 4 (1).
Schistosomiasis: New York (City) 11.
Silicosis: New Hampshire 1, Arkansas 1, Idaho 8, Colorado 2, New Mexico 4 (2).
Yaws: Panama Canal Zone 11.
Yellow fever: Panama Canal Zone 8 cases (5 confirmed), 6 deaths. Nov. 11-Dec. 30, 1948.
Lymphocytic choriomeningitis: Massachusetts 4 (1), Rhode Island 2, Indiana 1, Tennessee 3 (4).

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
G. St. J. Perrott, Chief of Division

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Public Health Reports

Vol. 64 • MAY 27, 1949 • *No. 21*

Birth of a Community Mental Health Clinic

By Edward Davens, M.D., and Paul Lemkau, M. D.*

In view of the current widespread interest throughout the country in establishing community mental health clinics, a circumstance in which the National Mental Health Act of 1946 is playing a significant, stimulating role, a detailed account of the preliminary community organization and planning preceding the opening of the Prince Georges County Mental Health Clinic might be useful.

When it became evident that Federal funds would become available to State mental health authorities to "develop adequate mental health programs, particularly in the fields of early prevention and treatment," Maryland, at the legislative session of 1947, enacted a bill providing for a mental health program to be administrated and supervised by the State Board of Health. The State Board of Health then ordered that a division of mental hygiene be established in the State Department of Health.

From the beginning the new division, in endeavoring to develop mental health facilities, has assumed that mental hygiene will take its place in preventive medicine along with all the other functions of a well-organized, comprehensive public health program and that the clinics will be held under general arrangements with the county health officer who will determine the location, the necessity and extent of service, and act as the liaison between community and clinic. It is expected that the clinics will be centers of in-service training in the health department so that the principles of mental hygiene will be used in all the services of the department eventually, from the prenatal program to the hospitals for the chronically ill.

At the outset the amount of money available for establishing community facilities for the early diagnosis, prevention and treatment of all types of emotional disorders was limited. When confronted with widespread and urgent need for a new service on the one hand, and insufficient funds and professional personnel on the other, the problem of how and where to start is always a difficult one.

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*Chief, Bureau of Child Hygiene, Maryland State Department of Health, and Director of Mental Hygiene Studies, Johns Hopkins University School of Hygiene and Public Health, respectively.

However, it was known that the Division of Mental Hygiene of the Federal Public Health Service was interested in establishing a project which would demonstrate the role of mental health clinic services as a part of a total public health program. State mental health authorities had been designated by most of the States after the National Mental Health Act was passed, but only a few of these departments had a mental health program in operation at that time.

Prince Georges County appeared to be a desirable location for such a project because its population of 150,000 is distributed in both urban centers and in rural areas, and it has a full-time county health department. But, in large part, the county selected itself as the location for a mental health clinic by the volume of prompt, vociferous and intelligent pledges of community support which stemmed from informal preliminary inquiry as to the local need and desire for such services.

Enumerated are the more important events in establishing the community mental health clinic in Prince Georges County, Md. The period covered starts with the first suggestions to county organizations in June 1947 and ends with the opening of the clinic doors January 19, 1948.

Initial Steps

On June 27, 1947, the acting chief, division of mental hygiene in the State Health Department wrote to the county health officer suggesting the possibility of starting a mental health clinic in Prince Georges County and further suggesting that a small meeting of interested citizens be called to explore the matter.

This resulted in a conference at the county office building on July 3 attended by the president of the County Medical Society, the chairman of the planning council of the Community Chest, the superintendent of education, the county health officer, the associate professor of clinical psychology at the University of Maryland (located in the county), the associate professor of public health administration at the Johns Hopkins University School of Hygiene and Public Health, and the acting chief, division of mental hygiene, State Department of Health. At this meeting the county health officer was instructed to call a larger meeting of representatives of additional organizations for the purpose of finding out how wide and solid a community backing could be mobilized.

The second meeting was held on July 11, 1947, and was well attended. In addition to those who were at the first meeting, the following organizations had representatives present: The County Welfare Board, Juvenile Court, League of Women Voters, Parent-Teacher Associations, Association of University Women, County Social Service League, Catholic Charities, Family Services (Green-belt) and additional staff members from county departments such as the supervisor of school attendance, the supervisor of public health nurses, and so on. The president of the University of Maryland came to this meeting and gave his enthusiastic endorsement and an offer of support in the very tangible form of a home for the proposed clinic on the campus of the university.

The health officer recalled sporadic attempts to establish mental hygiene clinics in the past and pointed out that for 6 years the county had been without any facility of this kind. The visitors from the State Health Department and the Johns Hopkins School of Hygiene then described in detail the organization, scope of services, and source of referrals of the proposed clinic and outlined the following essential prerequisites: First, community interest and enthusiasm resulting in widespread support of the clinic by all agencies and individuals; second, a satisfactory place for the clinic to operate, preferably in a dwelling or residence rather than in an office or public building; third, an active mental hygiene committee or society to sponsor the mental hygiene clinic on a lay level in the county.

Before adjournment, the group formed the interim committee for mental hygiene, and one of the representatives of the Community Chest, an able and active civic leader, was elected chairman and was empowered to appoint his own executive committee to work on public relations and publicity for the clinic. It was further decided that the committee would be responsible for expressions of opinions from their own organization to be embodied in a letter to the Director of Health, Maryland State Department of Health, with a copy to the county health officer. Steps were also taken to get similar action from other organizations and from individuals.

Meanwhile a mental hygiene committee of the County Medical Society had been appointed and met on several occasions with the chairman of the interim committee, representatives of the State Health Department, and the adviser from the Johns Hopkins School of Hygiene. These meetings resulted in an invitation to present the mental hygiene proposal to the County Medical Society at a special meeting August 19. On the latter occasion the president of the society and the chairman of the society's mental hygiene committee gave a clear and comprehensive picture of the need for such services, and the scope and functioning of the proposed clinic. The guests from the State Health Department and School of Hygiene amplified these remarks and answered questions. The society then unanimously passed a resolution to give its enthusiastic and complete support to the project and instructed the president to write a letter indicating this to the State Director of Health.

The Response

Some idea of the vigor, earnestness, and widespread community support for mental hygiene clinics can be drawn from the response. A few excerpts from the letters [1] will illustrate:

FROM THE PRESIDENT, COUNTY MEDICAL SOCIETY:

"The Medical Society feels that the county with its population of 150,000, situated as it is between Baltimore and the District of Columbia, offers an excellent opportunity in every respect to demonstrate the effectiveness of such a clinic where no similar facilities exist.

"Moreover, the presence of the University of Maryland with its Department of Psychology, its speech correction clinics and its reading clinics offers further advantages. Here would be an opportunity to train clinical psychologists and to augment the staff of such a clinic with graduate students from the university.

"As a result of the discussion, the Medical Society has gone on record as wholeheartedly endorsing the establishment of a mental hygiene clinic in Prince Georges County, and will support such a clinic."

FROM THE COUNTY SUPERINTENDENT OF EDUCATION:

"I know of no greater need for anything in Prince Georges County than for a mental hygiene clinic which could cooperate with various public and private agencies in helping to solve the many problems that come to our attention. The public schools alone could provide 75 to 100 cases annually.

"We have recently increased our staff to include three visiting teachers working with a supervisor of pupil personnel, and we also have a supervisor of health education. It seems that the more we do in improving this type of service in our department, the more we recognize the need for a mental hygiene clinic."

FROM THE COUNTY HEALTH OFFICER:

"In our home visits by the public health nurses, many problems arise that would be benefited in a large measure by the availability of mental hygiene clinic services. Many of the public health diseases are accompanied by mental maladjustments, especially tuberculosis and venereal disease.

"In the schools, the nurses are often asked by the teachers where they can refer children with severe behavior problems, and we have been, in the past 6 years, at a total loss to give an adequate answer."

FROM THE AMERICAN ASSOCIATION UNIVERSITY WOMEN (COLLEGE PARK BRANCH):

"Our organization is aware of the fact that this county has been without such clinic service for 6 years, and that preventive work done by a properly staffed clinic will rehabilitate scores of individuals who otherwise could be a burden on the county . . . We feel that the referral agencies—the schools, the social agencies, the juvenile court, and others—will derive great benefit from a mental hygiene clinic."

---

[1] All letters were sent to the State Director of Health with copies to the county health officer.

FROM THE PRINCE GEORGES COUNTY LEAGUE OF WOMEN VOTERS:

"The rapid population growth of the county has focused public attention on so many other needs that it has both delayed provision of mental hygiene clinics and aggravated the need for them . . . Teachers and truant officers testify that proper advice in mental hygiene for both pupils and parents undoubtedly would eliminate much of their disciplinary work, and prevent a large proportion of juvenile cases from reaching the courts. Social workers also tell us that many broken homes in which they work could be saved or repaired with the help of mental hygiene services."

FROM THE PRINCE GEORGES COUNTY PARENT-TEACHER ASSOCIATIONS:

"We wish to urge you to do everything possible to locate the mental hygiene clinic in our county. We are willing to cooperate with your staff to the fullest extent. Our council is composed of 32 local units with a total membership of 6,455 and we are in a position to help marshal public opinion in support of this experiment."

FROM THE COMMUNITY CHEST AND PLANNING COUNCIL:

"For some time we have seen the difficulty encountered by social service agencies in obtaining necessary advice and consultation for adults and children with varying degrees of maladjustment, emotionally or mentally. We have not had mental hygiene resources in our county for about 6 years, and it is quite a struggle to get appointments in greatly overloaded clinics in Washington and Baltimore . . . Needless to say, I feel there is ample and energetic popular support in the county for such a project."

FROM THE UNIVERSITY OF MARYLAND, DEPARTMENT OF PSYCHOLOGY:

"May I take this way of expressing the interest of this department in offering our support to the attempt to obtain a mental hygiene clinic for Prince Georges County. As you may know, with the support of the president we have developed a strong university advisement center and are adding to our staff in the field of clinical psychology. Our work leads us to recognize the genuine need for a mental hygiene clinic in this immediate area. You may count on the staff of this department to cooperate with you in any attempt to establish such a clinic and to support it professionally thereafter."

FROM THE JUVENILE COURT:

"The board of directors for the newly established Juvenile Court in Prince Georges County had its first meeting July 18, 1947. One of the matters considered at this time is the need of a mental hygiene clinic to round out and complete the services to children which the court will initiate and work through."

FROM THE COUNTY WELFARE BOARD:

"The Prince Georges County Welfare Board has very much felt the need for a mental hygiene clinic for a great many years. We believe that, to a degree, the lack of such a clinic has definitely limited the helpfulness of our service to a large group of people."

FROM THE CATHOLIC CHARITIES:

"Our agency has been forced to use the clinics in Baltimore and Washington for our most urgent cases and has been unable to give the needed service to many other families faced with problems needing psychiatric treatment. We hope that a full-time mental health clinic will be established in Prince Georges County through the appropriations made available under the National Mental Health Act."

FROM A NEGRO COMMUNITY:

"At a regular meeting of the town council of North Brentwood, a Negro incorporated municipality, I was appointed to conduct the correspondence with the mental hygiene committee relative to the establishment of a mental hygiene clinic in the health department. We are wholeheartedly in favor of such a clinic and will help to support it, morally and financially."

Following the expressions of community support, the Director of the State Health Department, acting with the Chief, Division of Mental Hygiene of the Federal Public Health Service, chose this county as the location for a full-time demonstration clinic.

With the help of the president of the University of Maryland, quarters for the clinic with adequate space and suitable arrangement were made available on the campus of the university which is located in the population center of the county.

Meanwhile the Public Health Service had recruited the clinic personnel—a psychiatrist, psychologist, two psychiatric social workers, a public health nurse, and clerical staff.

The chairman of the mental hygiene interim committee requested his executive committee to draw up a proposed constitution and bylaws for the advisory board of the clinic, and worked on plans for a large open meeting of elected representatives of all organizations or groups of any type in the county. Wide publicity was given to this open meeting which was held February 25, 1948, at the University of Maryland with official representatives of some 100 organizations or groups and about 200 other interested individuals present. The agenda included talks on the purpose and objectives of the clinic;

adoption of the proposed constitution; election of the advisory board to the clinic, and discussion.

After discussion from the floor a few changes were made and the constitution [2] to govern the advisory board of the clinic was adopted, following which the nominating committee, appointed by the chairman of the interim committee, presented a panel of 12 names in accordance with procedures outlined in the constitution. The first board was then elected at this widely representative open meeting. The wide scope of community representation can be appreciated by examination of the initial membership which included (1) the chairman of the Mental Hygiene Committee of the County Medical Society, (2) the chairman of the Planning Council of the Community Chest, (3) the County Superintendent of Schools, (4) the County Health Officer, (5) the Juvenile Court Judge, (6) the chairman of the Mental Hygiene Committee of the Parent-Teacher Association, (7) member of the faculty of the University of Maryland, (8) representative of the County Federation of Women's Clubs, (9) representative of Service Clubs, (10) representative of the Negro population, (11) representative of Catholic Churches, and (12) president, County Ministerial Association.

A few days after the clinic was formally opened January 19, 1948, appointments had been made 2 weeks ahead. The acceptance by the public of this type of service was indicated by the fact that more than half of the cases were self-referred.

Few people in the county are uninformed about this clinic and a great many know they had a real part in its organization. The processes of its evolution precluded any notions that only certain types of cases or certain groups would be served. From the start, the Prince Georges Clinic was truly an all-purpose mental hygiene clinic and has already demonstrated conclusively that mental health problems are a direct concern of all groups and each individual in the community.

CONSTITUTION

Advisory Board, Prince Georges County Mental Health Clinic

ARTICLE I

NAME

Section 1. The name of this organization shall be the Advisory Board of the Prince Georges County Mental Health Clinic, hereinafter referred to as the Board.

ARTICLE II

PURPOSE AND OBJECTS

Section 1. The purpose and objects of this Board shall be:

---

[2] This constitution is reprinted at end of article.

To provide a vitally interested advisory group with wide community representation for the Prince Georges County Mental Health Clinic.

To advise the Director of the Prince Georges County Mental Health Clinic in matters of policy relating to community relationships.

To assist in promoting active cooperation with the clinic of all community agencies having allied interests in planning the over-all mental health program of the county, and more specifically in carrying out, when indicated, plans for modification of the clinic patient's environment.

To insure that the clinic remains a truly community-wide enterprise and does not become unduly influenced by any special group.

Section 2. The purpose and objects of the Prince Georges County Mental Health Clinic shall be:

To provide an all-purpose community mental health clinic as a part of the public health services of the County Health Department.

To serve the community by providing out-patient treatment for personality and behavior disorders of patients not in need of hospitalization and, most significant, for patients in the early stage of illness when the prospect for cure is greatest.

To serve the schools in helping solve the varied mental and emotional problems of children especially in the areas of behavior disorders, mental retardation, and school attendance.

To serve the social agencies particularly in helping solve the emotional problems of children in broken homes or foster homes.

To serve the courts by providing consultative service at the request of the judge of the court.

To serve physicians by providing consultation service for patients presenting mental or emotional problems, if such consultation is not available from psychiatrists in private practice.

To serve the mental hospitals by helping provide prehospitalization service and by referring those in need of institutional care to the hospital; by helping provide supervision and followup treatment of boarded-out patients, and of provisional discharge of convalescent post-hospitalization cases.

To provide mental health education including dissemination of information about mental health principles and practices, active case-finding programs, and the study and control of mental diseases from a public health standpoint. Understanding that the clinic cannot do this job alone, to coordinate its educational activities with those of the school, the health department, and other community agencies.

ARTICLE III

MEMBERSHIP OF BOARD

Section 1. The Director of the clinic and 12 elected members shall constitute the Board. Six of the elected members shall represent the following: (1) County medical society; (2) county department of education; (3) courts; (4) community chest; (5) parent-teacher associations; (6) county health department. The remaining six members shall be elected at large from other community groups especially interested in mental health as the churches, women's clubs, fraternal orders, university, and others.

Section 2. Tenure of office—Four of the elected members elected at the first meeting shall serve for 3 years; four shall serve for 2 years; and the remaining four shall serve for 1 year. Thereafter the procedure shall be as follows: At each annual meeting to elect four members for 3 years. No member should serve more than three consecutive years. In case of vacancy, a member shall be elected at the next annual meeting to fill the unexpired term. The term of newly elected officers shall begin at the end of the meeting at which they were elected.

ARTICLE IV

OFFICERS OF BOARD

Section 1. The officers of the Board shall be chairman, vice chairman, and executive secretary, elected by the members of the Board.

Section 2. The chairman shall preside at all meetings.

Section 3. The vice chairman in the absence of the chairman shall act as presiding officer, or in the event of vacancy in the office of chairman, he shall assume the duties of chairman until the Board elects a new chairman.

Section 4. The executive secretary to the Board shall be the director of the Prince Georges County Mental Health Clinic. He shall keep lists of members; notify the membership of meetings; take care of records and correspondence; perform all secretarial duties for the Board; and collaborate with the chairman on preparing the agenda for meetings.

Section 5. Tenure of office—The chairman and vice chairman will be elected from the membership of the Board once a year. The Director of the clinic will be the permanent executive secretary of the Board.

ARTICLE V

ELECTION OF BOARD

Section 1. Members of the Board will be elected at an open meeting of a committee-at-large. This committee-at-large will be composed of a representative appointed annually by each organization or group within the county interested in mental health activities.

Section 2. The chairman of the Board will appoint a nominating committee of three members to present a panel of nominees to fill the vacancies on the Board. The Nominating Committee shall obtain in writing from each of the six organizations specified in article III, the name of the nominee to represent them on the Board, and will then choose an additional list of six nominees, no two of which shall be from the same community group.

ARTICLE VI

VOTING OF THE BOARD

Section 1. Quorum—A quorum for any meeting of the Board shall consist of of not less than a majority of the members. When less than a quorum is present, any motion under consideration must be submitted to the absent members by the executive secretary to be voted upon by mail.

Section 2. Voting—A majority shall determine all questions except those pertaining to constitutional amendments as provided for in article VII.

Section 3. Executive secretary shall have no vote.

ARTICLE VII

AMENDMENTS

Section 1. The constitution of the Board may be amended by a two-thirds vote of the members of the committee-at-large at an open meeting, provided the notice of the proposed amendment has been given in writing to the executive secretary and transmitted by him to all members not less than 30 days prior to the meeting.

ARTICLE VIII

MEETINGS

Section 1. The Board shall meet once a month. Special meetings may be called at the discretion of the chairman, or on written application of any four members.

Section 2. The Board shall call a meeting of the committee-at-large annually in February for the purpose of electing new Board members.

ARTICLE IX

BYLAWS

Section 1. The Board may adopt or amend bylaws in accordance with this constitution by a majority vote of members present.

Effects of DDT Dusting on Domestic Rats Under Colony and Field Conditions

By Jack E. Dent, Harvey B. Morlan, B. S., and Elmer L. Hill, M. D.*

After reports from the field and direct observations indicating that mice and rats were being killed on premises where a dust consisting of 10 percent DDT in pyrophyllite was being distributed for typhus control, closer observations were undertaken to study these side effects.

The work of Lillie, Smith, and Stohlman (*1*, *2*, *3*) demonstrated a characteristic histopathology and showed that DDT (2,2 Bis-parachlorophenyl-1,1,1 Trichlorethane) or its derivative, DDA (P, p′= dichlorophenyl-acetic acid), could be recovered from rats which had received known dosages of DDT. The current study was undertaken to determine the extent of DDT toxicity in a rat colony under simulated field conditions and in the field where normal DDT dusting operations were conducted.

Description of the Colony

A surplus concrete block building with a concrete floor measuring 20 by 100 feet was prepared for this study by ratproofing its two outside doors, 26 windows, and wall-ceiling junctures. Ten harborage boxes 12 by 12 by 8 inches were provided. Seven of these, with glass tops, were placed on the floor near the wall; two boxes were elevated on 4-foot legs and one was suspended from a wooden rack by a broom handle so that it could swing free about 4 feet above the floor. Rats were able to locate additional harborage in the structural features of two temporary rooms, each measuring about 10 by 12 feet. Telephone wire and one-half inch electric cable were suspended at about a 6-foot height the length of the building. Rags, paper and corn husks were provided for nesting material. A permanent watering station in the form of a sheet metal pan 30 by 36 by 1½ inches was located near one of the doors. Grains, carrots, cabbage, various other vegetables and meat scraps were placed in the center of the floor for ready observation from both doors and most windows. Electric lights were allowed to burn for night observation.

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*Typhus control specialist, S A. sanitarian (R) (entomologist), and surgeon, respectively, Epidemiology Division, Typhus Investigations (Thomasville, Ga.), Communicable Disease Center, Atlanta, Ga. Cooperating in the study was the Georgia Department of Public Health, O. D. Bowdoin, M. D., Director, Division of Preventable Diseases; Roy J. Boston, Director, Typhus Control Service.

From November 22, 1946, to February 27, 1947, 119 rats (*Rattus rattus*) were introduced into the building. These rats were caught by hand to avoid trap injuries; however, even this procedure was not totally lacking in trauma. Each rat was weighed, measured, sex determined when possible, and identified with aluminum ear tags. These tags had been torn out by the rats prior to the time of treating the colony, thereby making it impossible to follow individual rats throughout the study.

Six rats died while the colony was being stocked (November 22, 1946, to February 27, 1947). No deaths occurred between February 27 and March 7, 1947. Between 8 and 9:30 a m. on March 7, 1947, the colony rats were chased from one end of the building to the other. Two counts taken at this time indicated that there were 113 rats surviving (43 males, 50 females, and 20 which were too young for determination of sex on superficial examination). All of the rats were active except for one with a broken hind leg. This injured rat was in good condition on May 24, 1947.

DDT Treatment of Colony

During the morning of March 7, 1947, 4.77 kilograms (10.5 pounds) of 10 percent DDT in pyrophyllite were distributed on the floor in patches and bands about 2 millimeters in depth. The water and feeding areas were encircled by a band approximately 30 centimeters wide and about the same distance removed from food and water sources. DDT dust was distributed in patches along the walls and elsewhere so that the more commonly used rat runs crossed one or more of these patches which extended about 30 centimeters from the wall.

Colony Observations and Results

The rats remained in hiding until about 5 p. m. On first encountering dust patches, rats were observed to stop abruptly and go around them whenever possible. By about 6 p. m., rats had become accustomed to the unusual dust patches and had crossed the band of dust in order to obtain food and water.

By the following morning, it was noted that every dust patch had been scattered and the more heavily used runs swept clear. Dust had patches in established rat runs so it was necessary to treat all potential runs in order to assure contact of the rats with the DDT dust.

Twenty-six rats were collected on May 22, 1947, from buildings in Thomas and Brooks Counties. These premises had been treated with 10 percent DDT in pyrophyllite 3 weeks to 3 months prior to this date. All of these rats were examined serologically for murine typhus antibodies. Tissues from five of them, picked at random, were analyzed histologically and chemically for possible evidence of DDT toxicity. Appreciable quantities of DDT and DDA were found in the livers and fat from four of these rats. Detailed results of tissue examination are shown in the table.

Results of serological, toxicological, and pathological studies of rats (Rattus rattus) *from DDT dusted habitats*

Rat No.	Date autopsied 1947	Typhus C-F	Milligrams per 100 grams [1]				Pathology [2] consistent with DDT poisoning	Remarks
			Liver		Fat			
			DDT	DDA	DDT	DDA		
S-2	Mar. 14	1:256	14.3	7.4	28.0	6.0	Yes [3]	Moribund rats from colony.
S-3	do	Neg.	25.0	11.9	50.3	3.9	Yes	
S-4	do	Neg.	22.3	13.7	111.3	18.6	Yes	
S-5	do	A. C.	6.5	.9	7.2	3.6	Yes	
S-6	Apr. 15	Neg.					Yes	
S-7	May 7	Neg.	Tr.		Tr.		Yes	
S-8	May 9	1:32	Tr.		Tr.		Yes	
S-9	May 15	Neg.	.6	.6	18.7	5.9	Yes	
S-10	May 19	1:32	1.2	.8	5.8	3.6	Yes	
S-37	May 27	1:16	2.2	1.0	2.0	23.1	Yes	Active rats from colony.
S-38	do	1:16	.5	.2	31.5	4.2	Yes	
S-39	do	1:16					Yes	
S-40	do	1:128	.8	.6	23.7	3.2	Yes	
S-41	May 28	1:32	.9	.4	<1.2	.8	Yes	
S-42	do	Neg.					Yes	
S-43	do	Neg.	.4	.2	<2.2	1.6	No	
S-44	do	Neg.	.4	.4	3.4	.4	Yes	
S-45	do	1:8					Yes	
S-46	May 29	Neg.					Yes	
S-47	do	1:32					Yes	
S-48	do	1:64					Yes	
S-16	May 22	Neg.	Tr.		Tr.		Yes	Active rats from premises in Brooks and Thomas Counties.
S-22	do	Neg.	1.1	.3	9.0	3.8	Doubtful	
S-26	do	Neg.	.4	.1	8.6	2.0	Yes	
S-30	do	Neg.	.8	.7	<2.8	<1.7	Yes	
S-34	do	Neg.	.7	Tr.	3.3	1.3	No	

[1] Chemical analyses by Division of Pharmacology, National Institutes of Health.

[2] Tissues examined by Division of Pathology, National Institutes of Health.

[3] The first four in this list were found on autopsy to have a diffuse inflammatory process in both lungs while most of the remainder showed evidence of patchy consolidation or atelectasis.

Six samples of 10 percent DDT dust, collected from premises that had last been dusted at various periods from 47 to 94 weeks previously, were analyzed for DDT by a modification of a method described by Schechter, Soloway, Hayes, and Haller (*5*).[2] The percentage of technical DDT varied from 7.7 (collected 62 weeks after application) to 10.4 (collected 56 weeks after application).

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[2] Analyses performed by Communicable Disease Center, Technical Development Division.

Summary

Data are presented, from a colony study and limited field collections of rats, which show that the distribution of 10 percent DDT in pyrophyllite in domestic rat habitats resulted in pathological changes consistent with DDT poisoning and in the accumulation of appreciable quantities of DDT and DDA in the livers and fat of exposed rats. These results indicated that DDT dusting for the control of diseases of domestic rodents not only decreased fleas significantly but also affected rodent populations directly. In the treated colony, 32.7 percent of the rat population apparently died from DDT poisoning within 7 weeks and 36.3 percent within 11 weeks after the colony habitat was dusted. General field observation indicated that such rates are in excess of those to be expected under field conditions where rats can exercise greater freedom in avoiding unfavorable situations.

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Avirulent Isolate of *Salmonella typhosa* 58 (Panama Carrier)

By H. C. Batson, Maurice Landy, and Arthur Abrams *

Since October 1936, the strain of *Salmonella typhosa* used by the U. S. Army Medical Department for the routine production of typhoid vaccine has been strain 58, also commonly known as the "Chronic Carrier" or "Panama Carrier" strain. This is a smooth, stable strain, highly virulent for mice, which was isolated from the feces of a chronic typhoid carrier [1] in Panama. The carrier, who had typhoid fever in 1913, has been under the continuous observation of the staff of the Board of Health Laboratory, Panama Canal Zone, since that time. Following his attack of typhoid, at least 115 positive cultures of *S. typhosa* had been isolated from him up to 1934 when a culture of this strain was received by the Army Medical School. Exhaustive studies on the morphology, biochemical activity, antigenic structure, mouse virulence and immunogenicity of this strain were conducted at the Army Medical School and have been reported in detail by Siler and his co-workers (*1*).

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*Scientific director, and bacteriologists, respectively, Department of Biologic Products, Army Medical Department Research and Graduate School.

[1] Referred to in (*1*) as the "Carrier Boxhill".

Periodically since 1936, cultures isolated from the carrier have been submitted to this laboratory for routine examination. Such an isolate, received in July 1948, was found morphologically, biochemically and antigenically similar to previous isolates from this individual except that it was essentially avirulent for mice. Previous and subsequent isolates from this carrier exhibited the usual high virulence for mice; the LD$_{50}$ being less than 10 organisms suspended in 5 percent mucin.

It has been the common experience of laboratory workers that freshly isolated strains of *S. typhosa* from chronic carriers are highly virulent and, accordingly, the occurrence of an avirulent isolate must be rare. It is the consensus that vaccines produced from avirulent organisms are of inferior immunogenic quality. In view of the importance of strain 58 in production of typhoid vaccine by the U. S. Army Medical Department and by many public health and commercial laboratories in this country, a brief account of the salient features of this unusual isolate is reported.

Culture. An agar slant culture of *S. typhosa* strain 58, received from the Board of Health Laboratories, Panama Canal Zone, as the current isolate from the carrier July 9, 1948, was entered in the Army Medical Department Research and Graduate School culture museum records as culture 42–A–58V.

Morphology. Microscopically the organisms appeared as typical, short, actively motile, gram negative bacilli.

Colonial appearance. Colonies on nutrient agar plates appeared as slightly dome-shaped, smooth, glistening, round, entire and opaque grayish white.

Biochemical reactions. Acid but no gas was produced in dextrose, maltose, mannitol, xylose and sorbitol. No fermentation was observed in lactose, sucrose, arabinose, dulcitol, inositol, rhamnose or salicin. Methyl red, H_2S production and nitrate reduction tests were positive. Voges–Proskauer and indole production tests, gelatine liquefaction and citrate utilization tests were negative. Acid was produced in litmus milk.

Antigenic analysis. An "O" antigen suspension prepared by White's method (*2*) was agglutinated readily by a *Salmonella ballerup* antiserum indicating the presence of Vi antigen. No agglutination of this suspension was observed with single-factor IX or XII antisera. Agglutination with these antisera was obtained, however, following heating of the suspension at 90° C. for 30 minutes. This heating reduced but did not destroy agglutinability with the *S. ballerup* antiserum (anti-Vi). In all cases, agglutination controls with saline and normal rabbit serum were negative. Broth cultures, although motile, failed to be agglutinated with single-factor "d" antiserum even after the culture had been subjected to serial passage through a semisolid medium.

Virulence tests. Comparisons were made of the virulence for mice of isolate 58V and of the standard strain 58. White Swiss mice, weighing 14–16 grams, were injected intraperitoneally with 0.5 ml. quantities of dilutions of 16-hour veal infusion broth cultures suspended both in 5 percent hog gastric mucin and in physiological saline. Each dilution preparation was tested in four groups of 5 mice each, two groups of females and two of males. All mice were selected and assigned at random and the groups were injected in random order. The results of these tests, in terms of the number of deaths in 72 hours at each dosage level, are presented in tables 1 and 2.

Table 1. *Mouse virulence of* S. typhosa *strains 58 and 58V administered in physiological saline*

Dose of organisms (in 0.5 ml.)	Strain of *S. typhosa*	
	58	58V
30, 000, 000	0/20*	0/20
90, 000, 000	5/20	0/20
270, 000, 000	6/20	0/20
810, 000, 000	20/20	0/20

Table 2. *Mouse virulence of* S. typhosa *strains 58 and 58V administered in 5 percent hog gastric mucin*

Dose of organisms (in 0.5 ml.)	Strain of *S. typhosa*	
	58	58V
5	13/20*	------
50	18/20	------
500	17/20	------
5, 000	19/20	------
30, 000	------	1/20
300, 000	------	3/20
3, 000, 000	------	8/20
30, 000, 000	------	20/20

*Numerators in tables 1 and 2 denote number of deaths in 72 hours; denominators, total mice injected.

Examination of the tabulated results reveals that, in contrast to the high degree of virulence exhibited by standard strain *S. typhosa* 58, isolate 58V was essentially avirulent. Administered in saline, a dosage of isolate 58V approaching a billion organisms failed to kill any mice. Administered in mucin, a dosage of isolate 58V in excess of 3,000,000 organisms was required to kill 50 percent of the mice. This was more than 600,000 times the dose (5 organisms) of standard strain 58 which produced the same mortality. Repeated attempts to detect virulence of isolate 58V following 6 to 10 transfers have been unsuccessful.

The occurrence of this avirulent isolate from a well-known typhoid carrier suggested an investigation of the relationship of virulence and immunogenicity through the use of vaccines prepared from these virulent and avirulent strains of common origin. These studies are now in progress.

Summary

The occurrence of an avirulent isolate of *S. typhosa* from the "Panama Carrier" is reported. Aside from the lack (or masking) of the "d" factor, this isolate differed from previous and subsequent isolates from this source only in its lack of virulence for mice.

REFERENCES

(*1*) Siler, J. F., and others: Immunization to Typhoid Fever. The Johns Hopkins Press, Baltimore, 1941.

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DEATHS DURING WEEK ENDED APR. 30, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended Apr. 30, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,531	9,077
Median for 3 prior years	9,021	
Total deaths, first 17 weeks of year	166,421	169,914
Deaths under 1 year of age	662	687
Median for 3 prior years	687	
Deaths under 1 year of age, first 17 weeks of year	11,215	11,766
Data from industrial insurance companies:		
Policies in force	70,463,032	71,068,300
Number of death claims	14,126	12,406
Death claims per 1,000 policies in force, annual rate	10.5	9.1
Death claims per 1,000 policies, first 17 weeks of year, annual rate	9.7	10.4

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 7, 1949

A total of 62 cases of poliomyelitis was reported for the current week, as compared with 68 last week, 107 last year, and a 5-year median of 26 cases for the corresponding week. (The 5-year average for the week is 41.) The largest number of cases (18) was reported in Texas (19 last week), and New York (7 cases, 2 last week) was the only other State which reported more than 5 cases. The total to date is 1,277, as compared with 669 for the same period last year (also the 5-year median), and the total since the average seasonal low point of the disease is 355 as compared with 321 for the same period last year and a 5-year median of 205.

The reported incidence of measles declined from 29,437 cases last week to 27,787 for the current week, which is only slightly above the median expectancy, 26,067. The total to date this year is 430,104, as compared with 334,940 for the corresponding period last year (also the 5-year median). The highest weekly incidence this year was for the week ended March 26, when 33,347 cases were reported.

The decline in the incidence of influenza continued, but it is of interest to note a late rise of the disease in Maine, where 501 cases were reported, as compared with 304 last week.

Two cases of anthrax were reported in Pennsylvania, bringing the total to date to 23, as compared with 26 for the same period last year. Seven cases of Rocky Mountain spotted fever were reported, 5 in the Mountain States, 2 in the South Central States; total to date 35, as compared with 22 for the same period last year. One case each of smallpox was reported in Kentucky and California. (Diagnoses of 2 cases previously reported in Mississippi have been changed to chickenpox, making the total cases to date 37, as compared with 44 for the same period last year.)

During the week 9,040 deaths were recorded in 94 large cities in the United States, as compared with 9,531 last week, 9,285 and 9,208, respectively, for the corresponding weeks of 1948 and 1947 (3-year median 9,208). Total deaths to date this year in these cities are 175,461, as compared with 179,199 for the corresponding period last year. Infant deaths in these cities for the current week are 652, as compared with 662 last week and a 3 year median of 660; total to date 11,867 as compared with 12,426 for the same period last year.

Telegraphic case reports from State health officers for week ended May 7, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever e	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	----	----	501	289	----	10	----	----	25	----	----	----	35	----
New Hampshire	----	----	----	157	----	3	----	----	7	----	----	----	3	----
Vermont	----	----	----	173	2	4	----	----	5	----	----	----	3	----
Massachusetts	9	1	----	590	----	----	----	----	169	----	----	2	66	----
Rhode Island	----	----	----	89	----	5	----	----	d 9	----	----	----	8	----
Connecticut	7	----	----	1,266	2	28	1	----	26	----	----	1	8	----
MIDDLE ATLANTIC														
New York	5	2	(e)	2,859	7	263	7	----	d 160	----	----	1	160	7
New Jersey	----	----	5	2,162	1	45	5	----	99	----	----	----	43	1
Pennsylvania	6	----	(e)	2,344	5	----	----	----	200	----	----	1	112	2
EAST NORTH CENTRAL														
Ohio	3	----	4	1,334	5	61	----	----	217	----	----	16	56	12
Indiana	7	3	----	186	----	6	----	----	43	----	----	----	10	20
Illinois	----	1	4	209	6	79	1	----	75	----	1	----	66	7
Michigan a	4	1	8	893	2	24	----	----	277	----	----	1	26	7
Wisconsin	----	1	2	2,115	----	6	----	----	30	----	----	----	29	1
WEST NORTH CENTRAL														
Minnesota	1	----	----	167	1	4	2	----	35	----	----	----	1	----
Iowa	----	1	----	61	----	5	----	----	15	----	----	----	----	6
Missouri	2	----	7	279	----	6	----	----	16	----	1	1	5	----
North Dakota	1	----	1	27	1	----	----	----	4	----	----	----	----	----
South Dakota	1	----	----	82	----	1	5	----	1	----	----	1	----	----
Nebraska	2	----	15	217	----	----	----	----	3	----	----	1	----	----
Kansas	1	1	1	741	----	28	----	----	11	----	----	1	6	----
SOUTH ATLANTIC														
Delaware	----	----	----	42	----	3	----	----	3	----	----	----	2	----
Maryland a	1	1	----	237	1	31	----	----	d 31	----	----	----	7	----
District of Columbia	----	----	----	90	----	14	----	----	1	----	----	----	1	----
Virginia	4	----	177	1,120	2	82	----	----	16	----	----	1	27	1
West Virginia	----	----	16	47	----	8	----	----	16	----	----	----	26	----
North Carolina	7	----	----	942	1	----	2	----	8	----	1	1	12	----
South Carolina	2	----	355	706	1	120	----	----	5	----	1	3	45	4
Georgia	3	----	26	374	----	140	----	----	2	----	----	3	8	12
Florida	4	----	4	158	----	16	1	----	9	----	----	1	4	----

EAST SOUTH CENTRAL														
Kentucky	3	-----	-----	456	5	-----	-----	-----	20	1	-----	1	24	6
Tennessee	1	-----	26	344	2	41	-----	-----	14	-----	-----	4	13	-----
Alabama	2	-----	77	336	1	52	3	-----	6	-----	-----	-----	12	14
Mississippi [a]	2	1	8	40	1	12	2	1	2	(1)	-----	-----	17	-----
WEST SOUTH CENTRAL														
Arkansas	2	-----	43	611	3	39	1	1	-----	-----	3	2	10	3
Louisiana	-----	-----	4	27	-----	18	-----	-----	2	-----	1	-----	2	2
Oklahoma	2	-----	20	458	-----	18	2	-----	4	-----	-----	-----	4	1
Texas	14	-----	648	1,971	8	239	18	-----	41	-----	1	6	36	15
MOUNTAIN														
Montana	-----	-----	3	161	2	11	-----	3	6	-----	-----	-----	7	-----
Idaho	-----	-----	13	236	-----	4	1	-----	13	-----	-----	1	1	-----
Wyoming	-----	-----	-----	18	-----	6	-----	1	2	-----	1	-----	-----	-----
Colorado	3	-----	-----	383	3	26	-----	1	3	-----	-----	1	1	-----
New Mexico	1	-----	-----	203	-----	2	-----	-----	5	-----	-----	-----	7	-----
Arizona	3	-----	31	182	-----	18	-----	-----	12	-----	-----	-----	12	-----
Utah [a]	-----	-----	-----	112	-----	-----	4	-----	7	-----	-----	-----	26	-----
Nevada	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----
PACIFIC														
Washington	-----	-----	1	598	2	2	-----	-----	19	-----	-----	-----	18	-----
Oregon	-----	-----	20	317	1	12	3	-----	19	-----	-----	-----	18	-----
California	4	-----	8	1,281	1	23	4	-----	[d] 68	1	-----	2	56	1
Total	106	13	2,023	27,787	66	1,500	62	7	1,770	2	10	52	1,079	-----
Median, 1944-48	190	11	1,426	26,067	96	-----	26	6	3,225	14	14	56	2,073	-----
Year to date, 18 weeks	2,875	151	67,420	430,104	1,517	40,799	1,277	35	47,862	[1] 37	446	774	18,040	-----
Median, 1944-48	4,821	153	182,740	334,940	3,171	-----	669	22	63,145	189	324	897	33,450	-----
Seasonal low week ends	(27th) July 10	-----	(30th) July 31	(35th) Sept. 4	(37th) Sept. 18	-----	(11th) Mar. 19	-----	(32d) Aug. 14	(35th) Sept. 4	-----	(11th) Mar. 19	(39th) Oct. 2	-----
Since seasonal low week	7,989	-----	103,690	482,497	2,361	-----	355	-----	70,580	52	-----	314	28,078	-----
Median, 1943-48 [b]	12,387	-----	323,351	380,886	4,675	-----	205	-----	101,716	[1] 267	-----	422	66,773	-----

---

[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944-45 to 1948-49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever; reported separately, as follows: Missouri, 1; South Carolina, 2; Georgia, 2; Tennessee, 1; Arkansas, 1; Texas, 1; Colorado, 1; California, 2; salmonella infection, not included, was reported as follows: New York, 1.
[1] Smallpox: Deducted, Mississippi, week ended Apr. 2, 1 case; week ended Apr. 9, 1 case. (Diagnoses changed to chickenpox.)

Anthrax: Pennsylvania, 2.
Alaska: Influenza, 1; measles, 5.
Territory of Hawaii: Measles, 151; poliomyelitis, 1.

PLAGUE INFECTION IN ARIZONA, NEW MEXICO, TEXAS, AND WASHINGTON

Under dates of April 28 and 29, and May 3, 1949, plague infection was reported proved in specimens of tissue and ectoparasites from rodents collected in Arizona, New Mexico, Texas, and Washington, as follows:

ARIZONA

Coconino County.—In a pool of 46 fleas from 14 white-footed meadow mice, *Peromyscus boylii*, trapped April 13, at a location 2 miles west of Parks, Ariz., on United States Highway No. 66.

NEW MEXICO

Guadalupe County.—In a pool of 50 fleas from 41 wood rats, *Neotoma albigula*, trapped April 21, and tissue from 1 rat (same species) found dead on April 20, all taken on a ranch approximately 4 miles west of Santa Rosa and 2 miles north of United States Highway No. 66; also in a pool of 9 fleas from 34 white-footed mice, *Peromyscus leucopus*, trapped April 21 in the same area.

Lincoln County.—In a pool of 135 fleas taken from 43 wood rats, *Neotoma albigula*, trapped April 8, along United States Highway No. 380, 2 miles east of Capitan; in a pool of 16 fleas from 25 white-footed mice, *Peromyscus boylii*, trapped April 7 on a ranch road at a point 3 miles north from United States Highway No. 380, 2 miles east of Capitan; in a pool of 64 fleas and in a pool of 50 lice from 34 wood rats, *Neotoma albigula*, trapped April 6, at a point on the same ranch road one-half mile north of United States Highway No. 380, 2 miles east of Capitan.

Socorro County.—In 2 fleas from 2 white-footed mice, *Peromyscus truei*, trapped April 9, at a location 10 miles west of Magdalena on United States Highway No. 60, then 9 miles south on New Mexico Highway No. 52; in tissue from 1 wood rat, *Neotoma albigula*, found dead in nest April 14, in Cibola National Forest, at a point 4 miles west on Water Canyon Road from United States Highway No. 60, 17 miles northwest of Socorro, and in a pool of 7 fleas from the nest of the above-mentioned rat; and in a pool of 3 fleas taken from 5 wood rats, *Neotoma albigula*, trapped April 16, in the same locality.

TEXAS

Cochran County.—In a pool of 52 fleas from 9 grasshopper mice, *Onychomys leucogaster*, taken April 6–8 at prairie dog colony approximately 27 miles north and 3 miles west of Plains; a pool of 6 fleas from 1 prairie dog, *Cynomys ludovicianus*, taken April 8; and a pool of 31 fleas from 2 wood rats, *Neotoma micropus*, collected April 5, near the same location. (Plague infection was first reported in Cochran County in 1946.)

Dawson County.—A pool of 143 fleas from 18 wood rats, *Neotoma micropus*, taken April 8, approximately 5 miles south and 1 mile east of Cedar Lake oil camp.

WASHINGTON

Grant County.—A pool of 340 fleas from 118 short-tailed meadow mice, *Lagurus curtatus*, trapped April 8 at a location 4 miles west of Soap Lake; a pool of 47 fleas from 48 short-tailed meadow mice, *Lagurus curtatus*, 22 fleas from 41 white-footed mice, *Peromyscus maniculatus*, and a pool of 22 fleas from 28 meadow mice, *Microtus montanus*, all trapped April 12 at a location 3 miles northwest of Ephrata.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—February 1949.—During the month of February 1949 certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence [1]									
	Panama City		Colon		Canal Zone		Outside the Zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	24		3		7		2	1	36	1
Diphtheria	3						2		5	
Dysentery:										
Amebic	7		1		1		1		10	
Bacillary					1		1		2	
Hepatitis, infectious			1		1		2		4	
Malaria [2]	5				4		93	1	102	1
Measles			1		1		2		4	
Meningitis, meningococcal	3				1				4	
Paratyphoid fever	1						1		2	
Pneumonia		6		3	7			2	[3] 7	11
Poliomyelitis	1								1	
Tetanus	1						1		2	
Tuberculosis		13		4	3			4	[3] 3	21
Typhoid fever							2		2	
Yaws	1						3		4	

---

[1] If place of infection is known, cases are so listed instead of by residence.
[2] 4 recurrent cases.
[3] Reported in the Canal Zone only.

FOREIGN REPORTS

CANADA

Provinces—Communicable diseases—Week ended April 16, 1949.—During the week ended April 16, 1949, cases of certain communicable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		7	4	182	597	15	15	45	150	1,015
Diphtheria		1		6				2		9
German measles				349	31	1	114	15	7	517
Influenza		77			4	1	2			84
Measles		67	19	117	168	95	59	209	252	986
Meningitis, meningococcal				1					1	2
Mumps		15	5	115	282	18	9	11	57	512
Scarlet fever		4	1	85	73			18	10	191
Tuberculosis (all forms)		3.	14	60	32	10	6	15	29	169
Typhoid and paratyphoid fever				3					3	6
Undulant fever					2	1				3
Venereal diseases:										
Gonorrhea	1	5	7	(1)	46	31	19	22	43	174
Syphilis		3	8	(1)	26	2	4	10	8	61
Other forms				(1)					1	1
Whooping cough		15		51	29				3	98

---

[1] Report for period not received.

NORWAY

Notifiable diseases—January 1949.—During the month of January 1949, cases of certain notifiable diseases were reported in Norway as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	16	Mumps	765
Diphtheria	28	Paratyphoid fever	1
Dysentery, unspecified	2	Pneumonia (all forms)	4,522
Encephalitis, epidemic	2	Poliomyelitis	7
Erysipelas	349	Rheumatic fever	117
Gastroenteritis	2,313	Scabies	2,517
Gonorrhea	362	Scarlet fever	445
Hepatitis, epidemic	135	Syphilis	102
Impetigo contagiosa	2,396	Tuberculosis (all forms)	282
Influenza	17,281	Weil's disease	1
Laryngitis	17,212	Whooping cough	1,888
Measles	4,967		

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January–February 1949	March 1949	April 1949—week ended—				
			2	9	16	23	30
ASIA							
Burma	1	1	3		2		
Bassein		1	3		2		
India	21,017	6,922	[1] 1,694	[1] 1,318	[1] 849		
Allahabad		1				1	2
Bombay	[2] 1						
Calcutta	[3] 1,180	[3] 611	[3] 215	[3] 255	[3] 265	[3] 349	
Cawnpore		11	2	1	2	7	3
Cuddalore	1	1					
Lucknow					1		
Madras	9		2	3	4		2
Negapatam	15	4	5	1			
Tuticorin	13	1					
India (French):							
Karikal	59						
Pondicherry	100						
Indochina (French):							
Annam	33	17	3				
Cambodia	6	5	21				
Cochinchina		1		1	1		
Pakistan	7,317	1,382			13		10
Chittagong	40	2			2		10
Dacca					11		
Lahore	4	1					

[1] Preliminary figures. [2] Imported. [3] Includes imported cases.

PLAGUE

(Cases)

AFRICA							
Basutoland	8						
Belgian Congo	2	1		1			
Stanleyville Province	2	1		1			
British East Africa:							
Kenya	1						
Tanganyika	15						
Madagascar	39	9			[1] 5	[2] 4	
Tananarive	1						
Rhodesia, Northern	2						
Union of South Africa	26						
ASIA							
Burma	268	2		3		1	
Mandalay	1						
Moulmein				2			
Rangoon	1	1		1		1	
China:							
Chekiang Province	2	3		2			
Wenchow	2	3		2			
Kiangsi Province		9					
India	10,480	7,548	[3] 1,424	[3] 298	[3] 304		
Indochina (French)	17	13	5	8	4	2	
Annam			3	2	1		
Cambodia	9	8	2				
Cochinchina	4	2		6	3	2	2
Laos	3						
Java	2						
Siam	87	40	6	4			
EUROPE							
Portugal: Azores	2						

See footnotes at end of table.

PLAGUE—Continued

Place	January—February 1949	March 1949	April 1949—week ended—				
			2	9	16	23	30
SOUTH AMERICA							
Peru:							
Lambayeque Department	4	1					
Piura Department		3					
Venezuela:							
Aragua State							1
OCEANIA							
Hawaii Territory [4]							

[1] Apr. 1-10, 1949. [2] Apr. 11-20, 1949. [3] Preliminary figures. [4] Plague infection has been reported in Hawaii Territory as follows: on Mar. 12, 1949, in a mass inoculation of 2 pools of tissue from 10 rats (8 and 2), taken on Maui Island; on Mar. 16, 1949, in mass inoculation of 3 pools of 29 fleas (7, 12, and 10) from rats trapped on the Island of Hawaii.

SMALLPOX

(Cases)

(P=present)

Place	January—February 1949	March 1949	April 2	April 9	April 16	April 23	April 30
AFRICA							
Algeria	64	23	3				
Angola	118						
Belgian Congo	[1] 379	[1] 102					
British East Africa:							
Kenya	7		2			2	
Nyasaland	335	207	7	32	11		
Tanganyika	101	21					
Uganda	17						
Cameroon (French)	8	13			[3] 5		
Dahomey	115	43	37	14	3		
Egypt			[3] 2				
French Equatorial Africa		4			[3] 1		
French Guinea	1						
French West Africa:							
Haute Volta	10	33			[3] 1		
Gambia	1	4			[4] 35		
Ivory Coast	50	36					
Morocco	5	1					
Mozambique	42	11					
Nigeria	16	1,133					
Niger Territory	27	92					
Portuguese Guinea	1						
Rhodesia:							
Northern	4						
Southern	40						
Senegal	6	8			[3] 1		
Sierra Leone	43	22					
Sudan (Anglo-Egyptian)	23	5					
Sudan (French)	46	36			[3] 2		
Togo (French)	25	21			[3] 5	[5] 3	
Union of South Africa	104	P		P	P		
ASIA							
Arabia	14	15	1	1			
Bahrein Islands	[6] 32	4		3	1	4	1
Burma	372	105	17	6	8	13	3
China	405	188		[3] 40	[5] 20	11	
India	11,183	10,006	2,672	1,787	1,458	[7] 274	[7] 191
India (French)	1						
India (Portuguese)	69	55	12	11			
Indochina (French)	1,507	443	58	61	13	7	
Iran	136	20	1				
Iraq	209	33	2	1	3	9	3
Israel	2						
Japan	4	12	2	2	5		
Java	835	1,631	246	239	211	265	169
Korea	135						
Lebanon	109	3	7	1			
Malay States (Federated)	34	8					
Pakistan	1,220	265	[7] 7	[7] 2	[7] 2	[7] 1	[7] 3
Philippine Islands:							
Mindoro Island	2						
Tablas Island			2				

See footnotes at end of table.

SMALLPOX—Continued

Place	January—February 1949	March 1949	April 1949—week ended—				
			2	9	16	23	30
ASIA—continued							
Portuguese Timor		2					
Siam	35	2					
Straits Settlements: **Singapore**		2					
Sumatra	27	[6] 9	3	7	1		2
Syria	182	39		27	3	5	
Transjordan	64	25	11	10	20	5	
Turkey. (See Turkey in Europe.)							
EUROPE							
Great Britain:							
England and Wales				[8] 5	[8] 6		
Italy	2						
Portugal: **Lisbon**	2	1					
Turkey	58	6	1				3
NORTH AMERICA							
Cuba: **Habana**		[8] 2					
Mexico	3	3	3				
SOUTH AMERICA							
Argentina							[9] 54
Brazil	[1] 50	1					
Colombia	257	31	5	6			
Ecuador	[1] 283	[1] 25					
Paraguay		[10] 1					
Peru	387						
Venezuela	[1] 233	[1] 120		1			

[1] Includes alastrim. [2] Apr. 1-10, 1949. [3] In Cairo. [4] In Bathurst, Feb. 5-Apr. 16, 1949. [5] Apr. 11-20, 1949. [6] Includes imported cases. [7] In cities only. [8] Imported. [9] Jan. 1-Apr. 30, 1949. [10] Alastrim.

TYPHUS FEVER*

(Cases)

(P=present)

AFRICA							
Algeria	20	7					
Basutoland	3						
Belgian Congo	[1] 16	[1] 10					
Egypt	27	38	40	5	3		
Eritrea	17	5					
Libya	33	32	6				
Madagascar: **Tananarive**	[1] 2						
Morocco	6	2		[2] 1			
Tunisia	6	14		[2] 22			
Union of South Africa	36	2	P	P	P		
ASIA							
Arabia: **Aden**		1					
Ceylon: **Colombo**	2						
China		2					
India	9	1					
India (Portuguese)	5			2			
Indochina (French)		1				1	
Iran	38	22	6				
Iraq	6	7		1	5		2
Japan	[3] 56	5	4	1	6		
Korea	23						
Lebanon	[1] 1						
Pakistan	6	209					
Palestine	100						
Philippine Islands: **Manila**	1						
Straits Settlements: **Singapore**	[4] 1						
Transjordan	5	6	17		9	4	1
Turkey. (See Turkey in Europe.)							
EUROPE							
Belgium		1					
Bulgaria	54	17	10				
Czechoslovakia	1	1		2	1		
France	1						
Great Britain: Island of Malta [1]	1			1			

See footnotes at end of table

TYPHUS FEVER—Continued

Place	January—February 1949	March 1949	April 1949—week ended—				
			2	9	16	23	30
EUROPE—continued							
Greece	19	2			1		
Hungary	5	7	2		1		
Italy	19	4					
Sicily	9						
Poland	69	79	1				
Portugal: Lisbon	1	1	2				
Rumania	220	77					
Spain	1						
Turkey	86	14	5	4	5	3	4
Yugoslavia	56	26					
NORTH AMERICA							
Costa Rica [1]	7	1	2	2			
Cuba [1]		1					
Jamaica [1]	2	3		1			
Mexico [5]	34		4	3			
Puerto Rico [1]	2						
SOUTH AMERICA							
Brazil	1	1					
Chile		35	6		4	9	
Colombia	305	31	8	8			
Curacao [1]	3						
Ecuador [4]	63	12			[6] 1		
Peru	2			2			
Venezuela [1]	4	3		1			
OCEANIA							
Australia [1]	19	13					[2]
Hawaii Territory [1]	3						

---

*Reports from some areas are probably murine type, while others include both murine and louse-borne types.

[1] Murine type. [2] Apr. 1-10, 1949. [3] Corrected figure. [4] Type unspecified. [5] Includes murine type. [6] Apr. 1-15, 1949.

YELLOW FEVER

(C—cases; D—deaths)

Place	January—February 1949	March 1949	April 1949—week ended—				
			2	9	16	23	30
AFRICA							
Belgian Congo:							
Stanleyville Province . . . D	4	1					
Nigeria:							
Lagos . . . C							[1] 2
NORTH AMERICA							
Panama:							
Pacora . . . C	[2] 8						
SOUTH AMERICA							
Brazil:							
Benjamin Constant, Amazonas State . . . D	1						
Cameta County, Para State		1					

---

[1] Cases admitted to Lagos Hospital from ship that arrived from two other ports in Nigeria—Warri and Burutu.

[2] Reported Jan. 15, 1949. Date of occurrence Nov. 11-Dec. 30, 1948. Five cases, all fatal, confirmed.

* * *

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TUBERCULOSIS CONTROL ISSUE NO. 40

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Public Health Reports

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—Editorial—

Interrelation of Social Problems

This month we publish the second of a series of studies of mortality among people discharged from tuberculosis sanatoria in New Jersey. The study includes 1,245 persons who had been in sanatoria for varying lengths of time—some for as little as 3 months or less, others for years. A number of almost inseparable factors have influenced these people and we must attempt to explore them insofar as possible to learn which are significant. A person with tuberculosis has many needs and before we can meet them we must understand them fully.

Medical treatment is, of course, the obvious essential. But also to be considered are many factors which have a bearing upon the way a patient responds to his particular therapy. What are these factors? What facilities do our communities have to deal with them? Most patients face a variety of psychological, financial, and personal adjustments which cannot be separated from one another. Emotional reactions to the disease itself influence the acceptance of the diagnosis and treatment. Fears of death and incapacity and resistance to dependency are pertinent realities. A patient may experience a sense of lowered status in his home. Children are deprived of the care of parents. Separation from home, loss of the power to make all personal decisions, necessary changes in vocational plans, careers, education, and way of living, all contribute to the problem of tuberculosis.

These emotional reactions are often intensified when there is financial strain or distress. Financial and psychological problems are interdependent and this very interdependence is a complicating factor. One may hide the other.

Although we are aware of some of the financial problems of some of the patients, few communities have any estimate of the total financial

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This is the fortieth of a series of special issues of PUBLIC HEALTH REPORTS devoted exclusively to tuberculosis control, which will appear in the first week of each month. The series began with the Mar. 1, 1946, issue. The articles in these special issues are reprinted as extracts from the PUBLIC HEALTH REPORTS. Effective with the July 5, 1946, issue, these extracts may be purchased from the Superintendent of Documents, Government Printing Office, Washington 25, D. C., for 10 cents a single copy. Subscriptions are obtainable at $1.00 per year, $1.25 foreign.

needs of the tuberculous group. Little is known of the actual number of tuberculous persons receiving financial assistance and even less is known of the financial problems of persons not receiving help from agencies. Because some examples of need are often so compelling, and because we invest so much time and effort in helping individual patients, we can arrive at the conclusion that we are giving assistance to large numbers of people. This is not necessarily so. A cursory examination of hospital and agency caseloads in several cities reveals only a very small number of tuberculosis patients or their families receiving financial aid. We need an objective count to replace the mental multiplication which has been almost inevitable so far. Most financial problems can be alleviated if we know what they are. How many patients have to give up a business? How many patients resist medical recommendations and delay treatment? How many wives have to go to work? How many families are broken? How many fathers need help to keep their families together? What housekeeping services are needed to prevent family disruptions? We must know the answers to such questions in order to attain adequate solutions.

In some areas there are the beginnings of inquiry into the subject of financial need as it is related to tuberculosis. Once some progress in this area is achieved, the other social components in tuberculosis will become increasingly clarified.

Robt. J. Anderson, *Medical Director,*
Chief, Division of Tuberculosis.

Studies of Patients Discharged From Tuberculosis Sanatoria

II. Mortality rates associated with selected characteristics of the patient population

By Agnes W. Brewster, A. B., and Ralph Carr Fletcher, M. A.*

This report, the second in a series dealing with a follow-up study[1] of tuberculosis patients, is limited to one of the areas in which such studies can be expected to yield useful data, namely mortality rates. Rates are given, first to show mortality during a 5-year period among a group of patients after they had been discharged for the first time from the sanatoria of one State, and second to bring out the association of certain characteristics of these patients and subsequent mortality.

Tuberculosis patients discharged from sanatoria face the future with various life expectancies. Their subsequent mortality is in part influenced, as in the general population, by sex, race and age.

The fact that they have had tuberculosis and have been treated for it may also affect their length of life. For one thing, tuberculosis is a disease which places great stress upon the family involved. It sometimes reduces the level of living to such a point that the mortality risk of the patient returning to the family group may be increased, since higher mortality rates are associated with lower family incomes. Premature efforts on the part of the patient to return to gainful employment in order to restore the standard of living may result in relapse and death. The marital status of the patients in this study, which gives some indication of family responsibilities, seemed therefore worth considering. The stage of disease on admission or discharge has for obvious reasons been generally associated with subsequent mortality of tuberculous patients (*1*, *2*, *3*, *4*, *5*, *6*). Differences in the length of the patients' residence in the sanatoria, which may in turn be influenced by the stage of the disease, and variations in the clinical condition on discharge also seemed worth investigating in relation to mortality.

In this study no distinction has been drawn between patients discharged "with consent" and those discharged "against advice." When the discharge of the patient has been "with consent" it may be assumed that he has obtained the maximum benefit from his period of hospital treatment. When his discharge has been "against advice" the patient, in departing, has rejected medical treatment. The authors consider this classification, usually termed "manner of discharge," so significant that they have reserved its consideration for a separate paper. Among those discharged "against advice" mortality rates were about three times as high as among those whose discharge was approved.

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[1] The first in this series, which dealt with a method of collecting basic data from central record systems, appeared in Pub. Health Rep. 63: 427-447 (1948).

This review of the characteristics which seem to have some bearing on subsequent mortality of patients covers the items which were available in the New Jersey records. Other writers have considered mortality in relation to the status of the sputum on discharge and in relation to collapse therapy treatment. Income, occupation and education of patients may also be reflected in post-sanatorium mortality since they may influence the seeking of diagnosis, acceptance of treatment, and post-sanatorium behavior. Data were not available on these items—sputum status, collapse therapy treatment, income, education and occupation. Follow-up studies including some or all of these factors would make a worthwhile contribution to our knowledge of tuberculosis.

Materials and Methods

Materials. The study is based on the records of 1,245 patients, 677 men and 568 women, discharged after their first period of sanatorium care from the public sanatoria of New Jersey between July 1, 1941 and June 30, 1942. The study materials were obtained from the State central file maintained by the New Jersey State Department of Institutions and Agencies and from the file of death certificates in the State Bureau of Vital Statistics. Careful checking indicated that these sources produced almost complete information on readmissions to the sanatoria of the State and on all deaths occurring among the discharged patients.

A detailed description of the population is contained in the first report in the series, with supplementary tabulations presented in the appendix of the present report. The study group of 1,245 people included 63 nonwhite males and 73 nonwhite females, comprising 11 percent of the whole group. Age range was from 17 to 80 years at the time of discharge, with a median of 37 for the males and 27 for the females. Slightly more than half the males were married, 37 percent were single and the remainder (8 percent) were divorced, widowed, or separated when they were admitted to the sanatorium. About 45 percent of the females were married, another 45 percent single and the rest divorced, widowed or separated on first admission to the institution.

On admission, 45 percent of the patients had been diagnosed as far advanced, 40 percent as moderately advanced and 15 percent as minimal cases of tuberculosis. Among the males there were slightly more far advanced cases (47 percent) than among the females (44 percent).

Although a greater proportion of cases were in the advanced categories, males left the institutions in greater numbers in the first months of sanatorium residence, 40 percent leaving before 6 months had elapsed compared with only 31 percent of the females. Consequently, the females on discharge had proportionately more cases arrested or quiescent.

Method. All follow-up studies have a common problem—the impossibility of locating every case after a lapse of years. Patients are lost because they move to other health jurisdictions, change their names through marriage, deliberately conceal a tuberculous history for a variety of reasons, and because death certificates are not allocated to the place of established residence.

The life-table approach to the analysis of biological data makes comparisons possible between groups observed at different periods of time or for differing lengths of time. When persons are observed for less than the full period of the follow-up study because they cannot be traced, the total number is usually adjusted for the losses. Generally such people are counted as having been observed for 6 of the 12 months making up the person-year.[2] It was not necessary to make such an adjustment in the data collected in New Jersey because patients were considered to have been observed for the full 5 years unless they had died.[3] The application of this adjustment to studies of discharged patients, when some of them have been observed for less than the full period, is clearly shown by Hilleboe (*1*).

The mortality rates were obtained by dividing the number of patients who died within a given year, by the number present at the beginning of that year. The 5-year cumulative death rate was obtained by dividing the total number who died during the 5 years by the number who were present at the beginning of observation (i. e., at the time of discharge from the sanatoria). The rates are based on all deaths, regardless of cause.

Some of the classifications used in this paper contain very small numbers of persons and deaths. Such rates have a relatively large standard error and should be treated with caution. They are nevertheless included because the authors wish to emphasize the importance of these classifications for future follow-up studies. Wherever the established rate is based on 50 or fewer persons of whom 5 or less died, the rates have been designated by italics in the tables. In evaluating the rates not appearing in italics, reference should be made to the tables found in the appendix of this report and in the body of the previous report. These tables give the populations for which the rates are derived.

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[2] Person-year: One person observed for one 12-month period.

[3] See pages 430–485 of the first report for an explanation of this point.

Findings

The follow-up showed that 914 of the 1,245 patients were still alive and 331 (26.6 percent) had died at the end of the 5-year study period. Of the number who had died, 64 percent (213) had far advanced tuberculosis when they were first admitted. These 213 far advanced cases represented 37.6 percent of all far advanced cases. Thirty-one percent of the deaths, or 101 cases, were moderately advanced on admission, about 20 percent of all the moderately advanced discharges. The 17 deaths among the minimal cases comprised 5 percent of all deaths and 9.3 percent of the minimal discharges.[4]

In the five sections which follow, death rates for some of the classifications are presented for the first year as well as for the whole 5-year period so that the reader may observe the differences in mortality between designated groups immediately after discharge.

Table 1 presents the procedure used in preparing the life tables and mortality rates. The basic unit used was the person-year. Of the 1,245 persons considered at the beginning of the study, 138 were lost through death the first year after discharge, making a death rate of 11.1 per 100 person-years of exposure to the risk of dying. In terms of 100 persons, this meant that 88.9 survived to the beginning of the second year. Of the 1,107 persons exposed to this risk the second year 71 died, giving a death rate of 6.4 per 100 person-years. The cumulative mortality through the second year was 16.8 with 83.2 persons per 100 surviving. This procedure was continued through the fifth year by which time 26.6 per 100 were shown to have died and 73.4 per 100 to have survived.

Table 1. *Annual mortality rates during 5 years after discharge for all patients admitted for the first time and discharged between July 1, 1941 and June 30, 1942*

A	B	C	D	Per 100 discharges		
				E	F	G
Year after discharge	Population at beginning of period	Deaths during period	Death rates each period $\frac{C \times 100}{B}$	Alive at start of each period	Total survivors at end of each period [E−(E×D)]	Cumulative total deceased by end of each period
0–1	1,245	138	11.1	100.0	88.9	11.1
1–2	1,107	71	6.4	88.9	83.2	16.8
2–3	1,036	53	5.1	83.2	79.0	21.0
3–4	983	44	4.5	79.0	75.4	24.6
4–5	939	25	2.7	75.4	73.4	26.6

The same procedure was used to obtain the observed death rates for each of the sex-race groups (table 2). To determine how the actual mortality rates of the New Jersey tuberculosis patients differed from the mortality of the general population of the country as a whole, the expected death rate (adjusted for the age distribution of the patient group) was compared with the observed death rate for each group for each year, and for the 5-year period.

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[4] Appendix table A gives a summary of the condition of these patients at the close of the 5-year follow-up in terms of the stage of their disease on admission and their subsequent readmission to the sanatoria.

Table 2. *Observed and expected death rate per 100 persons for the 5-year period following discharge, and for each year separately*

Sex and race	Observed rate						Expected rate[1]						Ratio of observed to expected					
	Years following discharge						Years following discharge						Years following discharge					
	All five years	1	2	3	4	5	All five years	1	2	3	4	5	All five years	1	2	3	4	5
All races, both sexes	26.6	11.1	6.4	5.1	4.5	2.7	4.3	0.8	0.8	0.9	0.9	0.9	6.2	13.9	8.0	5.7	5.0	3.0
Male	28.4	11.8	8.0	5.5	4.6	2.0	5.7	1.1	1.1	1.1	1.2	1.2	5.0	10.7	7.3	5.0	3.8	1.7
Female	24.5	10.2	4.5	4.7	4.3	3.4	2.6	0.5	0.5	0.5	0.6	0.6	9.4	20.4	9.0	9.4	7.2	5.7
White race, both sexes	23.4	9.9	5.5	4.3	3.9	2.2	4.0	0.7	0.8	0.8	0.8	0.9	5.9	14.1	6.9	5.4	4.9	2.4
Male	25.8	10.6	6.9	5.1	4.3	1.7	5.4	1.0	1.0	1.1	1.1	1.2	4.8	10.6	6.9	4.6	3.9	1.4
Female	20.6	9.1	3.8	3.5	3.3	2.7	2.3	0.4	0.4	0.5	0.5	0.5	9.0	22.8	9.5	7.0	6.6	5.4
Nonwhite race, both sexes	52.2	20.6	14.8	13.0	11.3	8.5	6.5	1.2	1.3	1.3	1.3	1.4	8.0	17.2	11.4	10.0	8.7	6.1
Male	53.1	23.4	20.4	10.3	8.6	6.3	8.3	1.6	1.6	1.7	1.7	1.7	6.4	14.6	12.8	6.1	5.1	3.7
Female	51.4	18.1	10.2	15.1	13.3	10.3	4.9	0.9	1.0	1.0	1.0	1.1	10.5	20.1	10.2	15.1	13.3	9.4

[1] Based on United States life tables.

The expected rates were based upon the death rate at each year of age among white males, white females, Negro males, and Negro females given in United States Life Table and Actuarial Tables, 1939–41 (7). For example, the number of white males aged 31 in the patient population was multiplied by the death rate for 31-year-old males in the general population to determine the number of deaths to be expected the first year. The expected deaths were subtracted from the original number to give the number of survivors. The number of survivors was then multiplied by the death rate for those aged 32, and so forth for the 5 years. The expected number of deaths for all the white males for each year following discharge was the sum of the expected number of deaths for each individual age group.[5]

Association of Sex, Age and Race with Subsequent Mortality. The death rates by sex and race for each year following discharge and for the whole 5-year period are given in the first part of table 2. This table reveals differences of varying magnitude in the mortality rates between the sex groups and greater differences between the race groups The death rates expected if these patients had not all had tuberculosis are also shown in table 2. Whereas the patients had an actual death rate of 26.6 per 100 in 5 years, their expected rate was found to be 4.3 per 100, a ratio of observed to expected of more than 6 to 1. It will be noted that the observed death rates for the white patients taper off by the fifth year and that the white male rate begins to approximate the expected rate. The rates for white females and nonwhite males while declining each year, are still substantially higher than the expected rates for the fifth year. The observed rate for nonwhite females is greater the third, fourth, and fifth years than it was the second year and the observed rate is still nearly ten times the expected rate the fifth year (fig. 1).

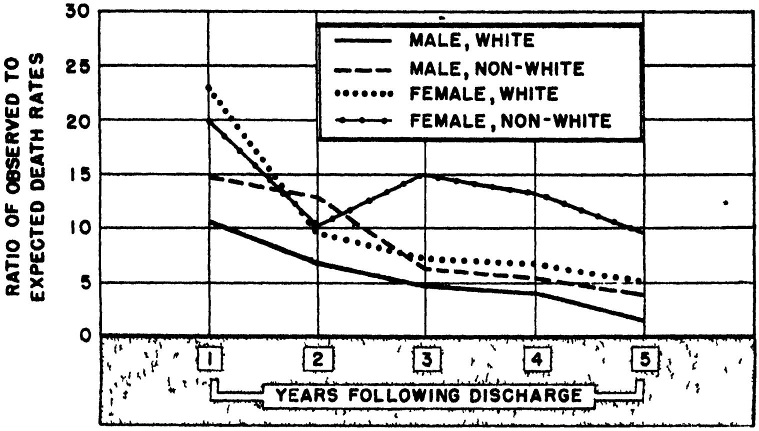

Figure 1. Ratio of observed to expected death rate for each year following discharge.

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[5] The estimated deaths for the white group were the sum of the deaths for the white males and white females. The total Negro deaths were similarly obtained from the Negro male and female totals Since the New Jersey study group contained only two nonwhite persons who were not Negroes, the Negro expectancies were used for the computations for the nonwhite group. The data for all races were obtained by combining the figures obtained for white and Negro males and white and Negro females. The sum of the survivors was determined by subtraction, and life tables based on 100 persons alive at the beginning of the 5 years were then computed for each of the 5 years for each of the sex-race classes and the designated groupings, by applying the age, sex, and race specific death rates to the patient population.

The New Jersey Life Tables (8) were not used for this operation because these tables were prepared for the white race only. Survival rates for each sex indicate no marked difference between the rates for the United States and those for the State of New Jersey in the age range under consideration.

In table 3 the mortality rates by age on discharge are shown separately by sex for the whole group and for the white patients. The relatively small numbers in the nonwhite category did not justify the computation of age specific death rates.

This table reveals that age on discharge appears to be a factor associated with the mortality rates of former patients. Among females the mortality rate for the 5 years following discharge is close to 22 percent in the groups below 50 years of age but rises to 49 percent among those past that age. Among males, the rate is 24.1 percent among the youngest age group. It is lower (16.1 percent) for the 20–29-year olds, rises again (25.7 percent) for those in the 30–49-year age bracket, and reaches 46.7 percent among those over 50.

Table 3. *First year and 5-year mortality rates by sex, race and age* [1]

[Per 100 persons]

Race and age	Males		Females	
	Death rate first year after discharge	5-year death rate	Death rate first year after discharge	5-year death rate
All races:				
17–19	10.3	24.1	9.3	22.2
20–29	6.3	16.1	9.7	21.9
30–49	9.8	25.7	8.0	22.5
50 and over	21.6	46.7	22.4	49.0
White:				
17–19	10.7	25.0	10.4	20.8
20–29	5.0	12.5	8.8	18.1
30–49	8.9	22.9	6.2	17.9
50 and over	19.5	44.8	20.0	44.4

[1] For number of cases see Pub. Health Rep. 63: 435 (1948).

Nearly half of the patients who were 50 years of age or older when they were discharged died within 5 years, and part of this high mortality was believed attributable to causes other than tuberculosis. That this was the case is shown in table 4 which gives the age distribution of tuberculous and nontuberculous deaths in the study group.

Table 4. *Number of deaths from tuberculosis and all other causes, by age, during 5 years following discharge*

Age	Number of deaths			Percent of all deaths assigned to tuberculosis
	All causes	Tuberculous	Nontuberculous	
Total	331	269	62	81.3
Under 20	19	18	1	94.7
20–29	89	84	5	94.4
30–39	65	57	8	87.7
40–49	56	47	9	83.9
50–59	59	45	14	76.3
60 and over	43	18	25	41.9

The table shows a constantly decreasing proportion of tuberculous deaths with increasing age, so that in the age group 60 and over, only two-fifths of the deaths were attributed to tuberculosis.

To determine whether the patient population suffered excessive mortality from causes other than tuberculosis when compared to the general population, the observed number of deaths from causes other than tuberculosis and the expected number of deaths from all causes were determined (table 5). The latter was obtained from the age-specific death rates of the general population (table 2), including deaths from tuberculosis. If the mortality of the tuberculous patients had been like that of the country at large, the expected number of deaths should have been higher than the observed number of deaths from nontuberculous causes, since deaths from tuberculosis contributed to the expected deaths. As this was not the case with the white patients, it was evident that the group was subject to heavy mortality from nontuberculous causes.

Table 5. *Deaths from nontuberculous causes compared to expected deaths from all causes, by race and sex*

Race and sex	Number of persons	Expected death rate[1] all causes (per 100 persons)	Expected deaths from all causes	Observed nontuberculous deaths	Ratio: column 4 / column 3
	1	2	3	4	
Males, white	613	5.4	33	40	1.2
Nonwhite	64	8.3	5	4	.8
Females, white	496	2.3	11	16	1.4
Nonwhite	72	4.9	3	2	6

[1] See table 2 for source of these rates.

Association of Marital Status with Subsequent Mortality. Table 3 showed that among males, those in the age bracket 20–29 had the lowest mortality rate. In this age group single men predominated; the first paper showed that 80 percent were single at the time of their admission to the sanatoria. In the similar age bracket for females 54 percent were single and 42 percent were married. Incidentally, 49 percent of all the women were between 20 and 29 years of age. The grouping by age for the women, unlike that for men, did not place a preponderance of one marital category in one age bracket.

The crude and age-adjusted death rates by marital status and sex are presented in table 6. (In this and in appendix table C the divorced, widowed and separated are considered as one group labeled "other.") The adjusted rates are standardized, respectively, to the age distribution of the whole male and the whole female patient population. The differences between the crude rates for the single and married males were of some magnitude. They were less striking when the age adjustment had been made, but were nevertheless present. Marital status seems to have a bearing on mortality subsequent to discharge among male but not among female patients. This is probably due to the fact that a larger proportion of the married men than the single men were in a far advanced stage of the disease on admission.

Table 6. *Five-year mortality rates by marital status* [1]

[Per 100 persons]

Five-year rate					
Males	Crude	Adjusted [3]	Females	Crude	Adjusted [3]
Single	16.3	28.3	Single	22.4	23.8
Married	34.3	33.2	Married	23.9	23.3
Other [2]	43.1	59.9	Other [2]	36.2	23.2

[1] For number of cases see Pub. Health Rep. 63: 436 (1948).
[2] "Other" includes divorced, widowed, separated.
[3] Adjusted to the age distribution of the male or female patients.

Association of Stage of Disease on Admission to the Sanatorium with Subsequent Mortality. The mortality rates by stage of disease on admission showed considerable differences between the groups divided into the three classifications: minimal, moderately advanced, and far advanced. Table 7 shows the observed death rates for the first year

Table 7. *Crude death rates 1 year and 5 years after discharge and age adjusted rates, by stage of disease, race and sex* [1]

[Per 100 persons]

Stage of disease on admission and race	Both sexes			Males			Females		
	Observed rates		Adjusted rate [2]	Observed rates		Adjusted rate [2]	Observed rates		Adjusted rate [2]
	1st year after discharge	5 years	5-year death rate	1st year after discharge	5 years	5-year death rate	1st year after discharge	5 years	5-year death rate
All races:									
Minimal	3.8	9.3	9.8	3.5	8.1	7.8	4.1	10.3	9.7
Moderately advanced	6.5	20.4	20.9	7.7	24.3	25.4	4.9	15.6	15.7
Far advanced	17.5	37.6	37.0	17.6	37.3	35.8	17.4	38.1	38.2
White:									
Minimal	3.7	9.2	9.6	4.0	7.9	7.4	3.4	10.2	9.6
Moderately advanced	6.0	18.4	18.8	7.2	22.1	23.0	4.4	13.8	13.8
Far advanced	15.6	32.9	32.3	15.3	33.7	32.3	16.1	31.7	32.0
Nonwhite:									
Minimal	[3] *5.8*	*10.5*	10.5	*0.0*	*10.0*	10.1	*11.1*	*11.1*	10.1
Moderately advanced	*11.4*	40.9	40.9	*13.0*	47.8	53.8	*9.5*	33.3	36.3
Far advanced	30.1	69.9	69.9	38.7	71.0	73.1	23.8	69.1	69.6

[1] For number of cases see Pub. Health Rep. 63: 436 (1948).
[2] Adjusted to the age distribution of all the patients in the designated sex-race class.
[3] Figures appear in italics to indicate that the rate is based on 10 or fewer persons who had five or fewer deaths.

after discharge and the 5-year rates by race and sex. In addition to the differences in rates by stage of disease, there were differences in the sex and race groups in the crude death rates. The rates for the nonwhite patients in both moderately advanced and far advanced groups were about twice those for the white patients in the first and the fifth years. The rate for white females who were in a moderately advanced condition on admission was somewhat lower than the same rate for white males.

The first report in this series showed that among older patients there was a larger proportion of cases in a far advanced stage of the disease than among younger patients. The 5-year mortality rates by stage of disease for each race-sex group were standardized to the age distribution of each group and the resulting adjusted rates are also given in table 7. The differences observed in the death rates between the stages of the disease do not appear to stem from peculiarities of the age distribution of each of the groups of patients, for the same disparities in rates are still observed after the age-adjustment.

The relationship of age to stage of disease and the association of both factors with mortality is shown in a more direct fashion in table 8

Table 8. *Five-year mortality rates by sex, age and stage of disease* [1]

[Per 100 persons]

Sex and stage of disease on admission	Age			
	Under 20	20–29	30–49	50 and over
Males:				
Minimal	25.0	3.4	3.0	18.8
Moderately advanced	21.4	11.4	26 0	39.3
Far advanced	28.6	27.3	30.5	55.6
Females:				
Minimal	14.3	0.0	16.1	37.5
Moderately advanced	12.5	13.5	14.3	36.8
Far advanced	46.7	36.8	31 8	63.6

[1] For number of cases see appendix table C.

The death rates prevailing for minimal, moderately advanced and far advanced cases are presented by age and sex.[6] When those with the same stage of disease on admission but between 20 and 49 years of age are compared with those past 50, the effect of advancing age on mortality may be clearly seen. Most of the differences between the males and females in the moderately advanced group are due to the differences found in the 30–49 age group.

In the next section the stage of the disease will be considered in relation to the length of the first sanatorium stay, to see whether there is some association between these factors and subsequent mortality.

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[6] See appendix table B for the population data.

Association of Length of First Sanatorium Stay With Subsequent Mortality. The 1,245 patients had varying lengths of residence in the sanatorium, ranging from a few days to many years. For convenience of analysis the patients were divided into four nearly equal groups according to length of hospitalization: less than 90 days (under 3 months), 90–181 days (3–6 months), 182–365 days (6–12 months), and over 1 year (13 months or more). Persons admitted to a sanatorium with a diagnosis of minimal tuberculosis appear to require less hospitalization than patients with advanced tuberculosis. The death rates prepared by length of stay therefore included a classification by stage of disease on admission (table 9).

Table 9. *Five-year mortality rates by stage of disease, sex and length of stay*[1]

[Per 100 persons]

Sex and stage of disease on admission	Periods of stay in sanatorium			
	Under 3 months	3–6 months	6–12 months	Over 1 year
All races, both sexes	32 8	31 7	27 1	20 6
Minimal	*10 4*	*6 7*	9 2	*12 0*
Moderately advanced	26 7	25 0	21 8	14 0
Far advanced	50 0	51 9	40 1	26 5
All races, male	35 5	36 2	28 3	19 4
Minimal	*7 7*	*9 5*	6 5	*12 5*
Moderately advanced	31 4	34 2	22 5	16 1
Far advanced	52 5	47 4	41 5	22 3
All races, female	28 3	25 6	25 6	21 8
Minimal	*13 6*	*4 2*	*11 8*	*11 8*
Moderately advanced	*16 1*	15 8	21 0	11 8
Far advanced	46 2	62 1	38 3	30 7

[1] For number of cases see Pub Health Rep 63 442 (1948)

There was a decided difference in 5-year mortality rates between the three groups remaining less than a year (a death rate of around 30 per 100) and those who stayed longer than 12 months (20.6 per 100), even when the stage of disease on admission was not considered[7] When the stage of disease was included, there was usually a downward trend in the rates, with increasing length of stay For the moderately and far advanced cases it was evident that the chances of survival were greatly increased if a patient remained in the institution at least a year.

The rate for the moderately advanced patients who stayed less than 3 months was 26 7 per 100, while it was only 14 per 100 for those remaining over a year. Among the far advanced, those who stayed less than 3 months had 50 deaths per 100 while those who remained over a year had 26.5 per 100. The higher death rates for females with far advanced disease were apparent when the female stay of 3–6 months or over a year was compared with the male stay of the same lengths. Death rates for males with moderately advanced disease were higher than the corresponding rates for females, the differences being greatest when the length of stay was short.

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[7] Part of this difference may be due to the fact that persons who died in the sanatorium within a year of their admission would not be included in these rates, while those who were discharged (e g after a 3-month stay) and then died within 12 months of their admission are included, since they were discharged alive

When the groups being studied are sufficiently large to permit additional cross classifications, length of stay is a factor which should be included as it appears from these findings that it has a significant influence on mortality. In institutions having a rapid turn-over of patients, mortality rates, even when specific for sex, race, age, marital status and stage of disease on admission, may be higher than similar rates in institutions which are able to hold patients until their condition warrants discharge.

Association of Condition on Discharge from the Sanatorium with Subsequent Mortality. A measure which should provide an index of the results of sanatorium treatment (the clinical condition of the patients at the time of their first discharge) is next considered. These data indicate that the condition of patients on leaving the sanatorium is directly related to their subsequent mortality, for the proportion who died increased constantly as medical appraisal of the discharge condition became less favorable. The death rates per 100 discharges for the whole group of patients are as follows:

Clinical condition on discharge	*Number dying, per 100 discharges, by the end of 5 years*
Arrested (inactive)	7.8
Apparently arrested (inactive)	12.6
Quiescent (inactive)	20.7
Improved (active)	25.9
Unimproved (active)	53.6

Table 10. *Mortality rates for first year and 5 years after discharge by sex, race and clinical condition on discharge* [1]

[Per 100 persons]

Race and clinical condition on discharge	Males		Females	
	Death rate for the first year after discharge	5-year death rate	Death rate for the first year after discharge	5-year death rate
All races:				
Arrested	1.7	8.3	0.0	7.4
Apparently arrested	1.5	10.8	1.0	15.0
Quiescent	4.7	21.9	2.7	18.9
Improved	9.3	30.2	9.4	21.6
Unimproved	31.1	50.5	35.0	58.6
White race:				
Arrested	1.8	7.3	0.0	6.7
Apparently arrested	1.7	10.1	1.1	11.4
Quiescent	4.2	18.8	1.6	15.9
Improved	7.2	27.7	8.5	18.5
Unimproved	29.7	47.3	32.9	51.3

[1] For number of cases see Pub. Health Rep. 63: 430 (1948).

In table 10 the death rates for all races and the white groups, by sex, are given for the first year and for the 5-year period. Almost one-third of the "unimproved" cases died in a year, and half were dead in 5 years. The differences between sex-group rates is slight except for those discharged "improved," where the rate for males is significantly higher than that for females.

Mortality rates by condition on discharge and stage of disease on admission have also been prepared (table 11). These rates are given for both sexes combined, since a classification by sex resulted in small numbers for some of the groups and the sex differences were not significant. With the exception of the minimal cases, where the rates are based on small numbers, there is an increase in mortality rates as the condition on discharge became less favorable. A large increase is noted between the death rates by stage of disease for those classified as "improved" on discharge and those classified as "unimproved." These findings are, of course, in accordance with expectations. Figure 2 illustrates the material in table 11.

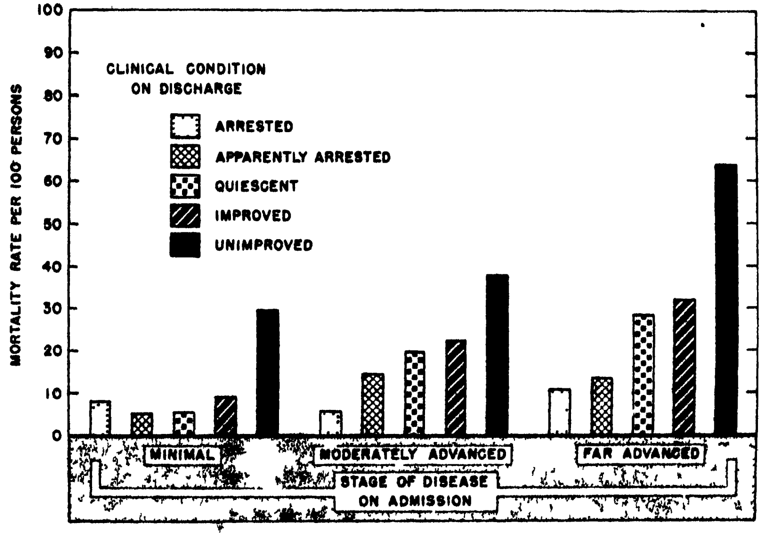

Figure 2. Five-year mortality rates by stage of disease on admission and clinical condition on discharge.

Death rates for single and married patients by clinical condition on discharge and sex were prepared. The data for arrested and apparently arrested cases were combined and the category of divorced, widowed and separated cases was omitted from this tabulation.

Table 11. *Five-year mortality rates by stage of disease on admission and clinical condition on discharge* [1]

[Per 100 persons]

Stage of disease on admission	Clinical condition on discharge				
	Arrested	Apparently arrested	Quiescent	Improved	Unimproved
Minimal	8.0	5.1	5.9	9.3	29.4
Moderately advanced	5.4	14.5	19.7	22.2	37.5
Far advanced	11.4	13.3	28.4	31.7	63.5

[1] For number of cases see Pub. Health Rep. 63: 440 (1948).

These rates are shown in table 12. In all groups except females discharged unimproved, the rate for married persons is higher than that for unmarried patients. Age standardization was not feasible for this table because of the small numbers resulting when an age break-down was made.[8]

Table 12. *Five-year mortality rates by clinical condition on discharge by sex and marital status* [1]

[Per 100 persons]

Marital status and sex	Clinical condition on discharge			
	Arrested and apparently arrested	Quiescent	Improved	Unimproved
Males:				
Single	4.6	14.0	16.9	43.6
Married	15.9	22.0	36.8	52.7
Females:				
Single	9.2	14.3	17.6	73.0
Married	12.1	21.2	20.2	45.6

[1] See appendix table C for distribution of cases.

A larger study population would permit further cross classifications such as the manner of discharge which might prove valuable in assessing the effect of acceptance of treatment on ultimate survival. Other cross classifications will undoubtedly occur to the investigator interested in applying follow-up data to particular problems of tuberculosis control.

Discussion

This study presents some detailed findings about the mortality rates of former sanatorium patients. The data were confined to first admissions so that patients could be followed from a time as close to diagnosis as possible. It is hoped that the results of these observations may be applied to problems of tuberculosis control. The death rates reported in a number of the tables confirm the findings of other investigators in this field. The proportions of cases in each stage of disease are similar to other studies of sanatorium discharges. The differences in death rates by race and sex likewise bear out other findings.

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[8] See appendix table C.

It is difficult to make exact comparisons with any of the other studies listed in the bibliography because each of them had some basic difference in the study group which tends to invalidate comparisons. One study group was limited to single admissions with 90 days or more of residence, another included readmissions in the basic group analyzed, basic differences in the age distribution of the patient populations were found, and so forth. Comparisons which reconciled these differences as far as possible were made between these studies and the New Jersey findings. The New Jersey death rates proved to be remarkably similar to those in other studies, indicating that the relationships between the different factors considered and subsequent mortality are unusually uniform in character. However, some of the classifications and cross classifications with the associated mortality rates in the present study have not been previously reported, to the authors' knowledge.

Admittedly, it is difficult to isolate the effect of a single factor, though the data appear to accord with expectancy when one or two factors such as stage of disease on admission, race, sex, or age are isolated. It seemed reasonable to assume then that the rates by classifications not previously made by other students of the subject probably have a fair degree of validity also. On such a premise, certain conclusions have been drawn from these findings.

Tuberculosis increased the observed death rate well above the expected death rate for each of the sex-race groups, but the increase was more marked for white females than for white males and for nonwhite females than for nonwhite males. The excess of observed to expected deaths seems therefore to be sex-determined rather than race-determined. The lower average age of the female patients explains in part their higher ratio of observed to expected deaths.

The ratio of observed to expected deaths was particularly high for the white females the first year after discharge. For nonwhite females it was almost as high the third and fourth years as the first year after original discharge. The ratio of observed to expected deaths for these 2 years was 15 : 1 and 13 : 1 compared to 20 : 1 the first year. At the end of 5 years, on the other hand, the ratio of observed to expected deaths among white males was close to unity, which indicates that follow-up for possible relapse has become less important each year for this group. This ratio was still so much higher than expectation at the end of the fifth year for the nonwhite males and females and the

Many more studies are needed to develop further data on the points suggested in this discussion. For example, a cross-classification showing race, sex, stage of disease on admission and length of stay as well as clinical condition on discharge and type of discharge, would reveal groups where special efforts to hold cases for an adequate treatment period would be most valuable. Further exploration of the differences in mortality rates between single and married men should make it possible to determine what factors cause the higher mortality of the married men. Reluctance to enter the sanatorium, and to remain there, and premature efforts to become gainfully employed could be due to economic pressures or to considerations of family stability. The authors hope that the study made in New Jersey has proved sufficiently challenging so that others may want to explore the subject further.

ACKNOWLEDGMENT

The authors wish to make special acknowledgment of the invaluable assistance of Edward S. Weiss, statistician, Division of Tuberculosis, for his counsel in the preparation of the manuscript.

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(*8*) State and regional life tables, 1939–41. Federal Security Agency, Public Health Service and National Office of Vital Statistics, U. S. Government Printing Office, Washington, D. C., 1948.

APPENDIX

Table A. *Number of patients by stage of disease on admission, subsequent readmission and condition on January 1, 1947*

Stage of disease on admission	All patients			Not readmitted			Readmitted				
								Alive			
	Total	Alive	Dead	Total	Alive	Dead	Total	Total	Out of sanatorium	In sanatorium	Dead
	Number of patients										
Total	1,245	914	331	894	730	164	351	184	139	45	167
Minimal	183	166	17	150	139	11	33	27	21	6	6
Moderately advanced	496	395	101	364	323	41	132	72	54	18	60
Far advanced	566	353	213	380	268	112	186	85	64	21	101
	Percentage distribution by condition on January 1, 1947										
Total	100.0	73.4	26.6	71.8	58.6	13.2	28.2	14.8	11.2	3.6	13.4
Minimal	100.0	90.7	9.3	82.0	76.0	6.0	18.0	14.7	11.4	3.3	3.3
Moderately advanced	100.0	79.6	20.4	73.4	65.1	8.3	26.6	14.5	10.9	3.6	12.1
Far advanced	100.0	62.4	37.6	67.1	47.3	19.8	32.9	15.0	11.3	3.7	17.9
	Percentage distribution by stage of disease										
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
Minimal	14.7	18.2	5.1	16.8	19.0	6.7	9.4	14.7	15.1	13.3	3.6
Moderately advanced	39.8	43.2	30.5	40.7	44.3	25.0	37.6	39.1	38.8	40.0	35.9
Far advanced	45.5	38.6	64.4	42.5	36.7	68.3	53.0	46.2	46.1	46.7	60.5

Table B. *Number of patients by sex, age and stage of disease on admission*

Sex and stage of disease on admission	Age			
	Under 20	20–29	30–49	50 and over
Males—Total	29	174	307	167
Minimal	8	29	33	16
Moderately advanced	14	79	123	56
Far advanced	7	66	151	95
Females—Total	53	280	186	49
Minimal	14	44	31	8
Moderately advanced	24	111	70	19
Far advanced	15	125	85	22
	Percentage			
Males—Total	100.0	100.0	100.0	100.0
Minimal	27.6	16.7	10.7	9.6
Moderately advanced	48.3	45.4	40.1	33.5
Far advanced	24.1	37.9	49.2	56.9
Females—Total	100.0	100.0	100.0	100.0
Minimal	26.4	15.7	16.7	16.3
Moderately advanced	45.3	39.6	37.6	38.8
Far advanced	28.3	44.7	45.7	44.9

Table C. *Number of patients by clinical condition on discharge, marital status and sex*

Marital status and sex	Total	Clinical condition on discharge				
		Arrested	Apparently arrested	Quiescent	Improved	Unimproved
Males	677	60	130	105	215	167
Single	252	26	61	43	83	39
Married	367	31	59	50	117	110
Other [1]	58	3	10	12	15	18
Females	568	81	100	74	213	100
Single	250	44	43	35	91	37
Married	260	27	39	33	104	57
Other [1]	58	10	18	6	18	6

[1] "Other" includes divorced, widowed, separated.

Characteristics of Commercial X-ray Screens and Films—VI

By Willard W. Van Allen, B. Sc.*

This is the sixth in a series of reports on the characteristics of commercial X-ray film-screen-developer combinations. The following tables represent the accumulated and revised findings of the Electronics Laboratory to date. An earlier report in this journal[1] described the technical details of this investigation.

Table 1. *Speed of fluoroscopic screen-film-developer combinations*[1] [2]

Film and developer [3]	Screens								
	D sample 1	D sample 2	D sample 3	666D sample 1	666D sample 2	B sample 1	B sample 2	B-2	E-2
Ansco Fluorapid:									
Eastman X-ray	120	150	155	100	125	--------	--------	--------	--------
Ansco Liquadol	105	125	140	75	100	--------	--------	--------	--------
G. E. Supermix	155	170	200	100	130	--------	--------	--------	--------
DuPont Fluorofilm:									
Eastman X-ray	95	115	130	80	100	--------	--------	--------	--------
Ansco Liquadol	90	110	120	65	85	--------	--------	--------	--------
G. E. Supermix	130	145	165	90	110	--------	--------	--------	--------
Eastman Blue Photoflure:									
Eastman X-ray	95	115	130	75	100	--------	--------	--------	--------
Ansco Liquadol	85	105	115	65	85	--------	--------	--------	--------
G. E. Supermix	110	120	145	75	95	--------	--------	--------	--------
Eastman Green Photoflure:									
Eastman X-ray	--------	--------	--------	--------	--------	60	70	95	140
Ansco Liquadol	--------	--------	--------	--------	--------	55	55	85	120
G. E. Supermix	--------	--------	--------	--------	--------	75	75	110	155

[1] Speeds are determined with film and screen in direct contact and therefore do not represent the speed of the same combinations when used in a photofluorograph.

[2] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table; these will include: Eastman Liquid X-ray; Eastman Rapid X-ray; Buck X-ray.

[3] Development time (as recommended by manufacturer of developer): Eastman X-ray Developer (dry ingredients), 5 minutes at 68° F.; Ansco Liquadol, 4 minutes at 68° F.; G. E. Supermix, 5 minutes at 68° F.

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[1] Pub. Health Rep. 64: 581 (1949).

Table 2. *Speed of intensifying screen-film-developer combinations* [1]

Screens	Film and developer [2]							
	Ansco High Speed [3]		DuPont No. 508			Eastman Blue Brand		
	Ansco Liquadol	G. E. Supermix	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman X-ray	Ansco Liquadol	G. E. Supermix
Buck:								
Xtra Speed	70	75	55	50	55	85	90	90
Midspeed	60	60	50	45	45	70	75	75
Definition	50	50	40	40	40	60	65	65
Eastman:								
Ultra Speed	110	110	90	85	80	140	145	145
Fine Grain	85	85	70	65	65	110	110	105
Definition	60	60	50	45	45	80	75	75
Patterson:								
High Speed	115	115	80	85	80	120	130	135
Parspeed	60	65	55	50	50	90	80	80
Detail	20	20	20	15	15	25	25	25

[1] Subsequent reports will contain data on additional developers used in combination with the films and screens shown in this table; these will include: Eastman Liquid X-ray; Eastman Rapid X-ray; Buck X-ray.

[2] Development time (as recommended by manufacturer of developer): Eastman X-ray Developer (dry ingredients) 4½ minutes at 68° F.; Ansco Liquadol, 3 minutes at 68° F.; G. E. Supermix, 3 minutes at 68° F.

[3] Test with Eastman X-ray Developer to be reported in a subsequent issue.

Table 3. *Average values of fog and contrast (gamma)* [1]

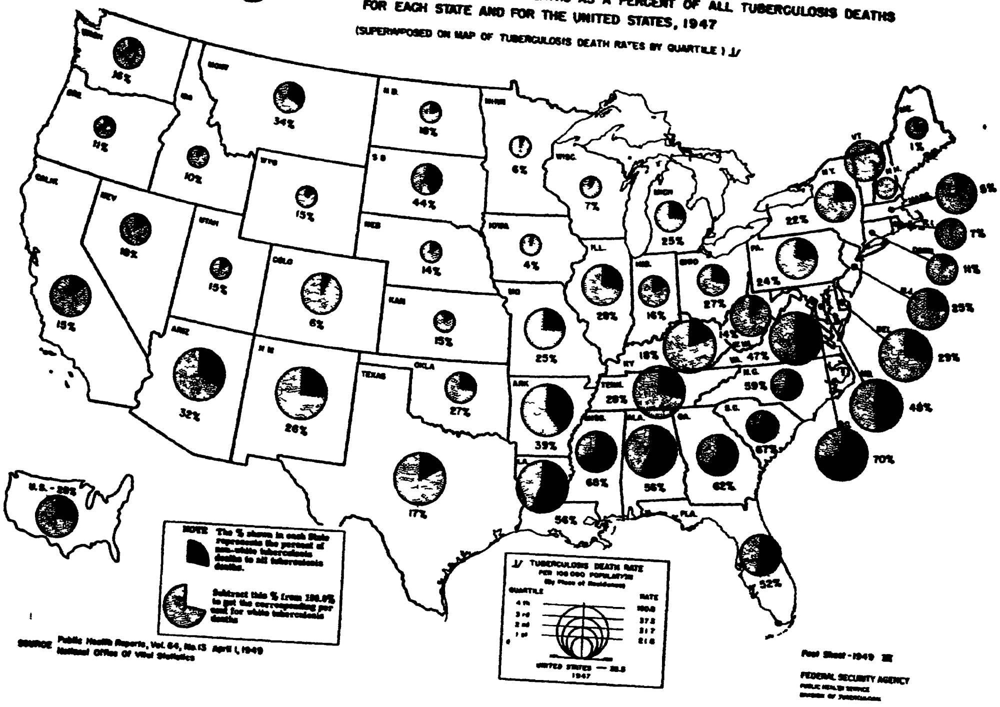
Film	Fog densities			Contrast (gamma)		
	Developer [2]			Developer [2]		
	Eastman X-ray	Ansco Liquadol	G. E. Supermix	Eastman X-ray	Ansco Liquadol	G. E. Supermix
Photofluorographic:						
Ansco Fluorapid Film	0.08	0.09	0.23	2.1	1.8	2.1
DuPont Fluorofilm	.21	.15	.40	1.9	2.0	2.1
Eastman Blue Photoflure	.07	.04	.09	1.8	1.8	1.9
Eastman Green Photoflure	.10	.11	.28	2.0	2.1	2.3
Roentgenographic:						
Ansco High Speed	----------	.10	.10	----------	2.8	2.8
DuPont No. 508	.18	.20	.04	2.6	2.7	2.0
Eastman Blue Brand	.06	.08	.06	2.8	3.0	----------

[1] Values obtained with open-tank development and continuous mechanical agitation at 68° F.

[2] Development time as given in tables 1 and 2. Subsequent reports will present similar data for additional developers used in combination with the films shown above. These will include: Eastman Liquid X-ray; Eastman Rapid X-ray; Buck X-ray.

WHITE AND NON-WHITE TUBERCULOSIS DEATHS AS A PERCENT OF ALL TUBERCULOSIS DEATHS FOR EACH STATE AND FOR THE UNITED STATES, 1947

(SUPERIMPOSED ON MAP OF TUBERCULOSIS DEATH RATES BY QUARTILE) 1/



NOTE The % shown in each State represents the percent of non-white tuberculosis deaths to all tuberculosis deaths.

Subtract this % from 100.0% to get the corresponding per cent for white tuberculosis deaths

1/ TUBERCULOSIS DEATH RATE PER 100 000 POPULATION (By Place of Residence)

QUARTILE	RATE
4th	100.0
3rd	37.3
2nd	31.7
1st	21.6
0	

UNITED STATES — 33.5
1947

SOURCE Public Health Reports, Vol. 64, No. 13 April 1, 1949
National Office Of Vital Statistics

Fact Sheet - 1949 III

FEDERAL SECURITY AGENCY
PUBLIC HEALTH SERVICE
DIVISION OF TUBERCULOSIS

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

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UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 14, 1949

The reported incidence of poliomyelitis increased slightly during the week—from 62 cases last week to 85. The increase was due largely to the report of a few cases in States which reported no cases last week and increases in California (from 4 to 9) and Oklahoma (from 2 to 8). The cumulative total since the first of the year is 1,362, as compared with 811 last year and a 5-year (1944–48) median of 728 for the same period. The cumulative total since the average seasonal low point of the disease, however, is 440, as compared with 463 last year and a 5-year median of 252. The excess over last year for the year-to-date total is due to a carry-over from the epidemic incidence in a few States last year.

Declines were reported for the current week in the incidence of measles, influenza, scarlet fever and whooping cough; and for the period since the first of the year new lows have been recorded for diphtheria, smallpox, typhoid fever, and whooping cough. One case each of smallpox was reported in Kansas and North Carolina, making a total of 39 cases to date, as compared with 44 last year and a 5-year median of 195 for the same period. A total of 22 cases of Rocky Mountain spotted fever was reported during the week, 14 east of the Mississippi River and 8 west, of which 4 were in the Mountain States. The total to date is 57, as compared with 29 for the same period last year.

During the current week 8,973 deaths (all causes) were reported in 94 large cities in the United States, as compared with 9,040 last week and with 9,422 in 1948, 9,360 in 1947 and a 3-year median of 9,390, respectively, for the corresponding weeks. Total deaths to date in these cities, 184,434, as compared with 188,621 for the corresponding period last year. Infant deaths in these cities for the current week totaled 611, as compared with 652 last week and a 3-year median of 746. Total to date this year, 12,478, as compared with 13,172 for the same period last year.

Telegraphic case reports from State health officers for week ended May 14, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever [c]	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	------	------	------	238	------	29	3	------	7	------	------	------	7	------
New Hampshire	------	------	------	59	------	------	------	------	1	------	------	------	------	------
Vermont	------	------	------	114	------	------	------	------	5	------	------	------	------	------
Massachusetts	7	1	------	692	------	5	3	------	157	------	------	1	82	------
Rhode Island	2	------	------	167	------	------	------	------	4	------	------	------	------	------
Connecticut	10	------	------	1,328	2	26	------	------	23	------	------	------	8	------
MIDDLE ATLANTIC														
New York	7	2	[e] 1	2,183	7	232	------	1	[d] 125	------	------	2	133	2
New Jersey	4	------	2	1,899	3	44	2	2	81	------	------	3	67	------
Pennsylvania	12	------	([e])	2,072	6	------	2	3	165	------	------	4	104	------
EAST NORTH CENTRAL														
Ohio	4	------	5	1,845	6	57	1	1	198	------	------	8	68	12
Indiana	3	------	------	210	1	4	1	------	37	------	------	1	14	24
Illinois	------	3	3	237	1	62	2	------	71	------	------	------	80	4
Michigan [a]	7	3	------	771	1	46	------	------	209	------	------	1	27	7
Wisconsin	------	------	16	2,151	1	5	2	------	36	------	------	1	38	------
WEST NORTH CENTRAL														
Minnesota	1	1	------	147	3	4	------	------	28	------	------	------	1	------
Iowa	------	------	------	78	1	2	------	------	8	------	------	------	5	13
Missouri	2	------	1	269	------	29	1	------	14	------	2	4	6	------
North Dakota	------	------	------	59	1	------	------	------	6	------	------	------	4	------
South Dakota	------	------	------	124	------	------	------	------	4	------	------	------	------	------
Nebraska	------	------	5	308	------	1	------	------	5	------	------	1	------	------
Kansas	1	------	1	496	2	12	------	------	15	1	------	------	8	------
SOUTH ATLANTIC														
Delaware	------	------	------	59	------	------	1	2	2	------	------	------	2	------
Maryland [a]	5	------	2	186	------	24	------	1	33	------	------	------	12	------
District of Columbia	------	------	------	115	1	9	------	------	4	------	------	------	1	------
Virginia	3	1	204	1,085	2	50	1	4	12	------	------	2	8	------
West Virginia	------	------	11	39	1	7	2	------	16	------	------	1	11	------

South Carolina	3	1	218	570	1	92	1		2			1	20	4
Georgia	3		6	374	1	36			5		2	3	6	8
Florida	2		2	246	2	12	1		2			2	6	3
EAST SOUTH CENTRAL														
Kentucky	2	1	9	487	3	50	3		21				24	14
Tennessee	3	2	29	508	6	73			33			1	29	
Alabama	1		129	277	1	26	5		6			1	5	11
Mississippi [a]	7		11	160		43	1		2		2	2	4	
WEST SOUTH CENTRAL														
Arkansas	2		18	580		57	3	2	4		2	1	8	2
Louisiana	3		4	30	3	39	4		5		2	2	1	2
Oklahoma	1		21	465	1	27	8		3		1	1	1	1
Texas	21	2	549	1,628	4	217	14	1	25			11	104	19
MOUNTAIN														
Montana	1		4	297				1	20					
Idaho			9	192	1	3	2	1	[d] 7				3	
Wyoming				8		13			2		1			
Colorado	3		12	205	1	21	1	1	7			1		
New Mexico	1			63	1	11	1		6			6		
Arizona	2		30	118		11	2		5			1	6	
Utah [a]	1			164		2	2	1	7				12	
Nevada [e]				49			1							
PACIFIC														
Washington	2		4	621	1	1			26				19	
Oregon			3	233	1	38	2		16				22	
California	7		8	1,411	6	19	9	1	[d] 65			4	74	4
Total	141	17	1,317	26,551	74	1,438	85	22	1,551	2	12	67	1,054	
Median, 1944-48	191	6	1,150	25.813	115		35	8	3,358	7	16	69	1,965	
Year to date 19 weeks	3,016	168	68,737	456,655	1,591	42,230	1,362	57	49,433	39	458	841	19.094	
Median, 1944-48	5,012	156	183,596	363,835	3,286		728	29	66,503	195	339	956	40,341	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	8,130		105,007	509,048	2,435		440		72,131	54		381	29,127	
Median, 1943-48 [b]	12,578		325,649	398,781	4,790		252		105,074	271		481	69,349	

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[a] Period ended earlier than Saturday.
[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944-45 to 1948-49, inclusive.
[c] New York City and Philadelphia only, respectively.
[d] Including cases reported as streptococcal infection and septic sore throat.
[e] Including paratyphoid fever, reported separately, as follows: Missouri 1; Virginia 1; South Carolina 1; Georgia 2; Texas 2; Colorado 1; Arizona 1; California 1; salmonella infection, not included, was reported as follows: Massachusetts 1.
[f] Report for three weeks ended May 14, 1949.

Alaska: Influenza 1; measles 4.

Territory of Hawaii: Measles 192; scarlet fever 1.

PLAQUE INFECTION IN ARIZONA, NEW MEXICO, AND WASHINGTON

ARIZONA

Coconino County.—Under date of May 2, 1949, plague infection was reported proved in a pool of 14 fleas from 17 white-footed mice, *Peromyscus boylii*, trapped April 2, 1949, 9½ miles west of Williams on U. S. Highway No. 66.

NEW MEXICO

Guadalupe County.—Under date of May 10, 1949, plague infection was reported proved in a pool of 148 fleas (3 different species), from 9 rock squirrels, *Citellus variegatus*, taken April 25, 1949, 4 miles south of Santa Rosa; and in a pool of 136 fleas (3 different species) from 5 rock squirrels, *C. grammurus*, taken April 27, 1949, in the same locality.

Taos County.—On the same date plague infection was reported proved in a pool of 107 fleas (3 different species) from 2 prairie dogs, *Cynomys gunnisoni*, and 20 burrows, taken April 26, 1949, at a locality 10 miles north of Taos on State Highway No. 3, thence 8 miles west on State Highway No. 11, thence 1 mile south on ranch road; and in a pool of 53 fleas (2 different species) from 2 prairie dogs, same species, taken in the same locality April 28, 1949.

Union County.—Under date of May 2, 1949, plague infection was reported proved in a pool of 13 fleas (single species) from 2 spotted ground squirrels, *Citellus mexicanus*, and in a pool of 7 fleas (single species) from 8 grasshopper mice, *Onychomys leucogaster*, trapped April 20, 1949, 1½ to 5½ miles south of Clayton on State highway No. 18.

WASHINGTON

Douglas County.—Under date of May 11, 1949, plague infection was reported proved in a pool of 157 fleas (2 different species) from 422 sagebrush voles (meadow mice?) *Lagurus curtatus*, taken April 25, 1949, on State Highway 10B, 16 miles west of Grand Coulee.

TERRITORIES AND POSSESSIONS

Panama Canal Zone

Notifiable diseases—March 1949.—During the month of March 1949, certain notifiable diseases were reported in the Panama Canal Zone and terminal cities as follows:

Disease	Residence[1]									
	Panama City		Colon		Canal Zone		Outside the zone and terminal cities		Total	
	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths	Cases	Deaths
Chickenpox	33		2		8		13		56	
Diphtheria	2	1							2	1
Dysentery:										
Amebic	3						1		4	
Bacillary	2				1		1		4	
German measles					1				1	
Hepatitis, infectious					2				2	
Leprosy							1		1	
Malaria[2]		1	1		1		89	1	91	2
Measles							1		1	
Meningitis, meningococcal	2							1	2	1
Mumps	1				1				2	
Pneumonia		2			10	1		2	[3] 10	5
Relapsing fever							1		1	
Tetanus	1	1							1	1
Tuberculosis		11		5	6	1		3	[3] 6	20
Yaws							1		1	

[1] If place of infection is known, cases are so listed instead of by residence.
[2] Three recurrent cases.
[3] Reported in the Canal Zone only.

DEATHS DURING WEEK ENDED MAY 7, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 7, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,040	9,285
Median for 3 prior years	9,208	
Total deaths, first 18 weeks of year	175,461	179,199
Deaths under 1 year of age	652	660
Median for 3 prior years	660	
Deaths under 1 year of age, first 18 weeks of year	11,867	12,426
Data from industrial insurance companies:		
Policies in force	70,427,342	71,061,430
Number of death claims	12,967	12,807
Death claims per 1,000 policies in force, annual rate	9.6	9.2
Death claims per 1,000 policies, first 18 weeks of year, annual rate	9.7	10.3

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended April 23, 1949.—During the week ended April 23, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		11		152	351	18	12	23	100	667
Diphtheria				5						5
Dysentery, bacillary				1						1
German measles				284	20		12	15	10	341
Influenza		87			7	2	1			97
Measles		156	36	115	143	156	87	255	277	1,225
Meningitis, meningococcal			1	1	1					3
Mumps		38	8	104	143	9	40	7	35	384
Poliomyelitis				1				2		3
Scarlet fever		1		55	81		2	4	5	148
Tuberculosis (all forms)		10	12	40	37	16	4	4	29	152
Typhoid and paratyphoid fever				15					2	17
Undulant fever								3		3
Venereal diseases:										
Gonorrhea		6	2	111	50	21	21	34	78	323
Syphilis		7	3	68	34	6	1	9	16	144
Whooping cough		10		71	41	4			1	127

FINLAND

Notifiable diseases—March 1949.—During the month of March 1949, cases of certain notifiable diseases were reported in Finland as follows:

Disease	Cases	Disease	Cases
Cerebrospinal meningitis	7	Poliomyelitis	4
Diphtheria	141	Scarlet fever	349
Gonorrhea	682	Syphilis	96
Paratyphoid fever	251	Typhoid fever	22

JAMAICA

Notifiable diseases—5 weeks ended April 30, 1949.—For the 5 weeks ended April 30, 1949, cases of certain notifiable diseases were reported in Kingston, Jamaica, and in the island outside of Kingston, as follows:

Disease	Kingston	Other localities	Disease	Kingston	Other localities
Cerebrospinal meningitis	1	1	Leprosy		2
Chickenpox	31	78	Scarlet fever		1
Diphtheria	3	1	Tuberculosis (pulmonary)	55	47
Dysentery	1	1	Typhoid fever	4	57
Erysipelas	1	5	Typhus fever (murine)		1

MADAGASCAR

Notifiable diseases—March 1949.—Notifiable contagious diseases were reported in Madagascar and Comoro Islands during March 1949 as follows:

Disease	March 1949			
	Aliens		Natives	
	Cases	Deaths	Cases	Deaths
Beri-beri			9	0
Bilharsiasis	1	0	135	0
Cerebrospinal meningitis	1	0	7	0
Diphtheria	3	0		
Dysentery:				
Amebic	28	0	207	2
Bacillary			2	0
Eyrsipelas			9	0
Influenza	33	0	2, 497	41
Leprosy			25	0
Malaria	296	1	38, 830	325
Measles	8	0	64	0
Mumps	4	0	210	0
Plague			9	5
Pneumonia, broncho			236	57
Pneumonia, pneumococcic	1	1	275	44
Puerperal infection			3	1
Tuberculosis, pulmonary	4	4	107	25
Trachoma	1	0		
Typhoid fever	2	0	25	5
Whooping cough			292	1

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

India—Calcutta.—For the week ended May 7, 1949, 248 cases of cholera were reported in Calcutta, India.

Pakistan—Dacca.—During the week ended April 23, 1949, 32 cases of cholera with 12 deaths were reported in the port of Dacca, Pakistan.

Plague

Basutoland.—During the period March 13–26, 1949, 3 cases of plague were reported in Mafeteng District, Basutoland, and during the week ended March 26, 1 case was reported in Maseru District.

Brazil.—Additional reports of plague in Brazil during the year 1948 have been received as follows: October 1–31, 1948, 50 cases, 9 deaths, of which 37 cases 9 deaths occurred in Bahia State, 12 cases in Pernambuco State, and 1 case in Ceara State; November 1–30, 1948, 27 cases, 5 deaths—16 cases 2 deaths in Bahia State, 5 cases 1 death in Ceara State, 4 cases 1 death in Pernambuco State, and 2 cases 1 death in Alagoas State.

Venezuela—Aragua State.—On April 28, 1949, 1 fatal case of plague was reported in Tejerias, Ricaurte District, Aragua State, Venezuela.

Smallpox

Great Britian—England and Wales.—On May 7, 1949, 1 case of smallpox was reported admitted to the Liskeard Smallpox Hospital, at Liskeard in Cornwall. This case is stated to have developed in a young woman residing in a small village a few miles from Liskeard. As far as could be determined she had had no contact with any of the passengers from the Steamship "Mooltan".

India.—Smallpox has been reported in certain cities in India as follows: Week ended April 30, 1949, Bombay 114 cases, New Delhi 71 cases, Madras 29 cases; week ended May 7, 1949, Bombay 88 cases, New Delhi 91 cases, Madras 16 cases.

Java—Batavia.—For the week ended April 30, 1949, 169 cases of smallpox were reported in Batavia, and for the week ended May 7, 150 cases were reported in that city.

Typhus Fever

Tunisia.—During the period April 1–10, 1949, 22 cases of typhus fever were reported in the military area of Zarzis in Tunisia.

Yellow Fever

Brazil—Para State.—On March 27, 1949, 1 death from yellow fever was reported in Cameta, Para State, Brazil.

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It contains (1) current information regarding the incidence and geographic distribution of communicable diseases in the United States, insofar as data are obtainable, and of cholera, plague, smallpox, typhus fever, yellow fever, and other important communicable diseases throughout the world; (2) articles relating to the cause, prevention, and control of disease; (3) other pertinent information regarding sanitation and the conservation of the public health.

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Public Health Reports

VOLUME 64 JUNE 10, 1949 NUMBER 23

THIS ISSUE

Summary of Antimalarial Drugs

Prevalence of Poliomyelitis in 1948

FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
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Public Health Reports

Vol. 64 • JUNE 10, 1949 • *No. 23*

Summary of Antimalarial Drugs

By W. Clark Cooper, M. D.[*]

At least a dozen chemical compounds, commercially obtainable or under large-scale investigative use, are currently being recommended for the management of malaria. All of these, except quinacrine, pamaquine and the cinchona alkaloids, have been introduced during the past 5 to 10 years. Since the new drugs have appeared in medical literature under a variety of synonyms, including numbers and proprietary names, there is little wonder that much confusion prevails as to the identity and relative merits of the available antimalarial agents.

This summary is not intended to be a critical review of all recent advances in the chemotherapy of malaria. Original references should be consulted for detailed descriptions of the various drugs and for evidence to support the generalizations which are necessary in a summary. Those familiar with the problems of making definitive comparisons of therapeutically active compounds will appreciate the need for many qualifying statements throughout the appraisals. As the characteristics of the predominant strains of malarial parasites in a given area may greatly influence the choice of drug regimens, dosage recommendations are intended to be merely representative. In all cases they refer to the oral dosage for an average adult.

It is now accepted that the early development of sporozoite-induced malaria in man takes place in fixed-tissue cells, as has been demonstrated for *Plasmodium vivax* (*1*). It is further believed that persistent fixed-tissue forms, not yet actually demonstrated histologically, are responsible for the repeated relapses of *P. vivax* and *P. malariae* infections, but that such persistent forms do not occur in *P. falciparum* infections. In vivax and malariae malaria, drugs which are active only against the asexual erythrocytic parasites will stop acute attacks, or will suppress parasites and fever as long as administered, but will not prevent relapses. The actual relapse rates following such noncurative therapy will be determined by a variety of factors, including strain of parasite, intensity of exposure, and status of host resistance.

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Curative chemotherapy of vivax or malariae malaria implies a significant reduction in the relapse rate, as contrasted with that following noncurative therapy, and presumably results from partial or complete destruction of persistent fixed-tissue parasites.

Protective treatment may achieve either causative prophylaxis or suppression. Causative prophylaxis implies action against the sporozoites or the succeeding pre-erythrocytic stages, prior to the first invasion of erythrocytes, and if complete, permanently prevents infection. Suppression implies action, usually against asexual erythrocytic parasites, sufficient to keep an infection latent at least as long as the drug is being administered. It may be carried out during a period of active exposure to infection, or it may follow treatment of an acute attack.

Gametocytocidal action indicates activity against the sexual erythrocytic parasites, which are necessary for the infection of mosquitoes. Such action, theoretically of public health value, does not in itself appear to affect the clinical course of malaria in the patient being treated.

All of the antimalarial drugs included in the summary are rapidly absorbed from the gastrointestinal tract. In the description of each drug a brief statement will be made as to its tissue localization, i. e., its tendency to become concentrated in certain cells of the body, and its rate of elimination, either by excretion or degradation. In general, a compound which is markedly localized in tissues is more effective if loading or priming doses are given at the start of therapy. Such a compound, particularly if its rate of elimination is slow, will be long retained in the body, permitting wider spacing of individual doses, shorter courses of treatment, and prolonged periods of protection against relapse immediately following therapy.

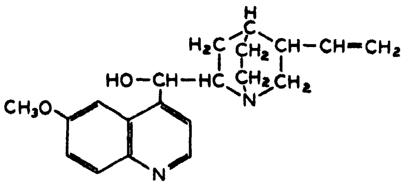
Names included in the U. S. Pharmacopoeia or approved by the Council on Pharmacy and Chemistry of the American Medical Association, will be used as principal designations. Official designations in other countries, code numbers, and proprietary names will be included as synonyms (without capitalization).

Data will be presented on the following:

Cinchona products: quinine, totaquine.
Acridine compounds: quinacrine.
4-aminoquinolines: chloroquine, oxychloroquine, sontochin, SN 10,751.
Biguanides: chlorguanide.
8-aminoquinolines: pamaquine, pentaquine, isopentaquine.

Quinine

6-methoxy-α-(5-vinyl-2-quinuclidyl)-4-quinolinemethanol



Salts: Sulfate of U. S. P XIII (83 percent base) is the salt most commonly used in the United States; dihydrochloride (82 percent base) is the most soluble salt and is used parenterally. There are many other official and proprietary preparations.

Dosage:

Therapeutic: 2 grams per day (0.65 gram, or 10 grains, three times daily) for 7 days.

Suppressive: 0.65 gram (10 grains) per day.

Quinine is only slightly localized and is rapidly metabolized; plasma concentrations drop 90 percent within 24 hours after dosage (*2*).

The most important antimalarial action of quinine is against asexual erythrocytic parasites. This stops acute attacks, but clearance of parasites and subsidence of fever are often not as rapid as with large doses of quinacrine (*3*, *4*, *5*, *6*), or the better 4-aminoquinolines (*6*, *7*, *8*). Vivax malaria may relapse as early as one or two weeks after therapy (*6*, *9*, *10*). Quinine has limited effect upon vivax and malariae gametocytes but no effect on falciparum gametocytes (*11*, *12*).

Quinine has no causative prophylactic action. When given protectively, it will usually suppress *P. vivax* and *P. malariae*, but parasites appear after drug is discontinued. It is less efficient as a suppressant of *P. falciparum* (*13*).

Quinine is also important because of the potentiation observed when it is given in combination with certain 8–aminoquinoline drugs, resulting in lowered relapse rates in vivax malaria (*10*).

Quinine may be given intravenously, but should be given slowly in a large volume of fluid (*14*). It is not well absorbed from muscle and may cause local necrosis (*11*, *12*).

Therapeutic doses commonly cause cinchonism, with tinnitus, vertigo, partial deafness, visual disturbances, headache, and nausea. An occasional individual with idiosyncrasy may have severe cinchonism, urticaria or angioneurotic edema from a single small dose (*11*, *12*)

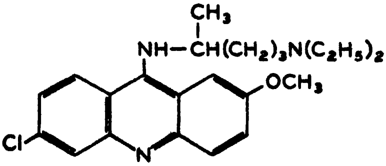
Totaquine

Totaquine is a standardized mixture of cinchona alkaloids, which according to U. S. P. XIII contains "not less than 10 percent of anhydrous quinine and not less than 70 percent and not more than 80 percent of total anhydrous crystallizable cinchona alkaloids, the remainder consisting substantially of diluents." A typical currently obtainable preparation contains 50 percent cinchonine, 18 percent cinchonidine, and 10 percent quinine. As all of these alkaloids possess antimalarial activity (*2*), treatment with totaquine results in more economical use of the active ingredients of cinchona bark.

Dosage is similar to that of quinine, and the therapeutic efficacy is essentially the same (*11*, *15*). It can only be given orally. Some preparations may produce nausea and vomiting more frequently than does quinine (*15*).

Quinacrine

6-chloro-2-methoxy-9(4-diethylamino-1-methylbutylamino)acridine



Synonyms: atabrine, atebrin, acriquine, chemiochin, chinacrin, crinodora, erion, haffkinine, italchina, mepacrine B. P., metoquina, metoquine.

Salts: hydrochloride of U. S. P. XIII is the dihydrochloride, dihydrate (79 percent base).

Dosage:

Therapeutic: 0.2 gram of salt x 5 (every 6 hours) on day 1; then 0.1 gram three times daily for 6 days, a total of 2.8 grams in 7 days.

Suppressive: 0.1 gram of salt per day.

Quinacrine is markedly localized, especially in leukocytes, liver, spleen, heart, and lungs (*16*, *17*). It is slowly eliminated, so that plasma concentrations drop only about 50 percent per week after the last dose (*18*).

The principal action of quinacrine is against asexual erythrocytic parasites. When loading doses are given, it stops acute attacks of malaria at least as rapidly as does quinine (*3*, *4*, *5*, *6*, *19*, *20*, *21*). Persistent exoerythrocytic stages of *P. vivax* are not affected; so vivax malaria will relapse, but parasites usually do not reappear until at least 4 to 6 weeks after treatment (*3*, *6*, *22*). Quinacrine resembles quinine in being ineffective against gametocytes of *P. falciparum* (*11*).

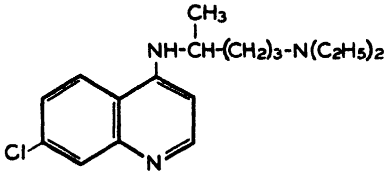
When given protectively, quinacrine has no causative prophylactic action, but it effectively suppresses erythrocytic parasites. Such suppression, continued for a sufficient time after exposure (e. g., 4 weeks) permanently prevents falciparum malaria (*13*), although resistant strains have been demonstrated (*23*). Vivax (and probably malariae) infections appear after drug is discontinued (*13*, *22*, *24*, *25*).

Quinacrine may be given intramuscularly in dosage of 0.4 gram (*16*). With rigid precautions it may be administered intravenously (*26*).

Although in recommended dosage quinacrine is usually well tolerated, more undesirable reactions occur than accompany treatment with 4-amino quinolines or (*26a*) chlorguanide. It temporarily dyes the skin yellow, but this is not a toxic reaction. It may produce anorexia, nausea, vomiting, and diarrhea, especially at the start of therapy. It is a cortical stimulant (*27*) and in susceptible subjects may cause temporary mental symptoms (*28*). In a small proportion of cases, serious skin reactions occur (*29*).

Chloroquine

7-chloro-4-(4-diethylamino-1-methylbutylamino)quinoline



Synonyms: aralen, resochin, nivaquine B, tanakán, SN 7618, 3377 RP.

Salts: diphosphate (62 percent base) for oral use; hydrochloride (89 percent base) for parenteral use. Nivaquine B is chloroquine sulfate.

Dosage:

Therapeutic: 1.0 gram of diphosphate (0.6 gram of base) as initial dose, followed in 6 hours by 0.5 gram (0.3 gram of base), then 0.5 gram (0.3 gram of base) once daily for 2 days, making a total of 2.5 grams of salt (1.5 grams of base) in 3 days.[1]

Suppressive: 0.5 gram of salt (0.3 gram of base) once weekly.

Chloroquine is markedly localized in liver, spleen, kidney, lungs, and white blood cells. Degradation and excretion are slow; plasma concentrations drop only about 60 percent per week after last dose (*30*).

The principal action of chloroquine is against asexual erythrocytic parasites (*31*, *32*). It stops acute attacks of malaria promptly (*6*, *7*, *21*, *30*, *33*, *34*, *35*, *35a*). It does not affect persistent exoerythrocytic stages, but vivax relapses are usually delayed until at least 7 to 10 weeks after treatment (*6*, *7*, *8*, *35*). Falciparum infections are usually cured (*31*, *32*). No data are available on quartan relapses. Gametocytes of *P. falciparum* resist chloroquine (*21*, *34*).

---

[1] As with all slowly eliminated drugs, single-dose therapy (0.6 gram of base) will prove adequate in many cases, especially if followed by a suppressive course.

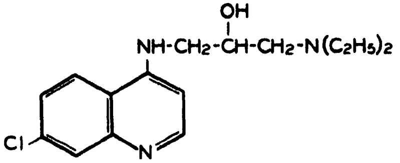
There is no action against pre-erythrocytic forms (*35, 36, 37*). Protective treatment suppresses parasites of all three species (*30, 38, 39, 39a, 40, 41, 42, 42a*); *P. vivax* (and probably *P. malariae*) may appear after drug is stopped.

Chloroquine hydrochloride may be given intramuscularly in dosage of 0.2 to 0.3 gram of base (*43*). Very slow intravenous injection is still in an experimental stage (*44*).

Chloroquine produces few side-actions in recommended dosages (*26a, 30, 45, 46*). It does not discolor the skin. Blurring of vision, pruritus, mild headache, and gastrointestinal complaints have been reported (*31*).

Oxychloroquine

7-chloro-4-(3-diethylamino-2-hydroxypropylamino)quinoline

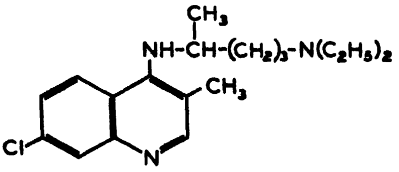


Synonym: SN 8137.
Salt: diphosphate (62 percent base).
Dosage: Not established.

Oxychloroquine, or SN 8137, resembles chloroquine in many respects. Although it is less toxic in man it is also slightly less active as an antimalarial (*30*). Small-scale trials in experimental and naturally-acquired malaria (*8, 39*) have not shown any advantages over chloroquine. It has not been given definitive trial as a suppressant (*40*). Oxychloroquine is not commercially available.

Sontochin

7-chloro-4-(4-diethylamino-1-methylbutylamino)-3-methylquinoline



Synonyms: SN 6911, 3038 RP, sontoquine, santoquine, santochin, nivaquine (except nivaquine B, which is a salt of chloroquine).
Salts: disulfate, monohydrate (61 percent base) has been most widely used in the United States. French investigators have used various other salts (*47*), of which nivaquine C, the dihydrochloride, is preferred.

Dosage:

Therapeutic: Dosages of base corresponding to those of chloroquine.

Suppressive: 0.1 gram of base per day, 0.3 gram twice weekly, or 0 3 gram once weekly (*48*).

Sontochin, like quinacrine and chloroquine, becomes concentrated in leukocytes, liver, spleen, and certain other body tissues; plasma concentrations decline about 25 percent per day after the last dose (*30*).

Like the other 4-aminoquinolines, sontochin acts against asexual erythrocytic parasites and alleviates acute attacks of malaria (*8, 30, 34, 47, 49, 50, 51*). Relapses of *P. vivax* can be expected at about the same intervals as after treatment with quinacrine (*51*), or sooner (*8*). It is not gametocytocidal against *P. falciparum* (*47, 50*).

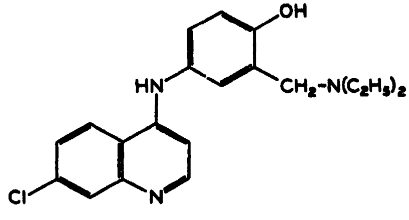
Sontochin is not a causative prophylactic (*36, 51*), but is an effective suppressant (*48, 51*).

Sontochin does not stain the skin and is well tolerated at recommended dosages (*52*). Parenteral use has been reported (*47*), but details are not available.

Sontochin is not commercially available in the United States.

SN 10,751

7-chloro-4-(3-diethylaminomethyl-4-hydroxy anilino)quinoline



Synonyms: amodiaquin, camoquin, miaquin, CAM-AQ1.

Salt· dihydrochloride, dihydrate (77 percent base).

Dosage:

Therapeutic: Dosages of base corresponding to those of chloroquine.

Suppressive: Dosages of base corresponding to those of chloroquine; 0.6 gram of base every 2 weeks has also been provisionally suggested.

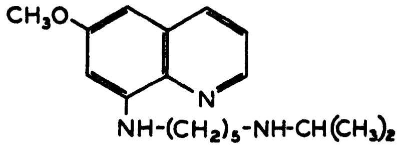
The drug is rapidly metabolized in the body. The degradation products are chemotherapeutically active and are slowly eliminated, plasma concentrations declining at the rate of about 60 percent per week (*53*).

The antimalarial activity of this drug appears to be analogous to that of chloroquine (*21, 53, 54, 55*). In controlled studies, relapses of vivax malaria are delayed after SN 10,751 almost as long as after chloroquine (*54*). Falciparum infections are apparently cured.

sufficient degree (5 to 10 percent of total hemoglobin), will be accompanied by cyanosis; abdominal cramps are common. Acute intravascular hemolysis is an infrequent but serious reaction (*93*, *94*), more common in Negroes. Concurrent quinacrine or sulfonamides should be avoided with all 8-aminoquinolines (*95*).

Pentaquine

6-methoxy-8-(5-isopropylaminoamylamino) quinoline



Synonyms: SN 13,276
Salt: phosphate (75 percent base).
Dosage:
- Therapeutic: 60 mg. of base per day (10 mg. every 4 hours) or 30 mg. of base per day (10 mg. every 8 hours), given concurrently with quinine sulfate 2 grams per day (0.65 gram three times daily), for 14 days
- Suppressive: Not used.

Like pamaquine, pentaquine is rapidly degraded in the body (*96*). There is apparently only slight tissue localization. Concurrent quinine results in slightly higher plasma levels, but concurrent quinacrine produces greatly elevated plasma concentrations of pentaquine (*95*).

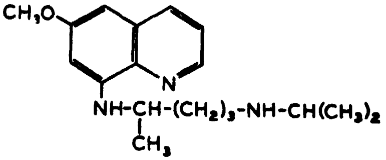
Although pentaquine has activity against the asexual erythocytic parasites of *P. vivax* (*97*, *98*), its real usefulness depends upon its ability, especially when given in combination with quinine, to lower the relapse rate of vivax malaria (*96*, *97*). The higher dosage given above is necessary for cure of heavy early experimental infections (*97*) but the lower dosage has lowered relapse rates of late, naturally acquired infections (*99*, *100*). The optimal dosage of concurrent quinine is not yet defined (*97*, *98*).

In very high dosage, pentaquine is a causative prophylactic against *P. vivax* (*92*), but its unsuitability for prolonged administration precludes such use in the field.

Pentaquine will produce a moderate elevation in methemoglobin, roughly proportional to dosage, so that some patients will exhibit cyanosis. Abdominal cramps, anorexia, nausea, vomiting, or drug fever may occur (*97*, *98*). Acute intravascular hemolysis is a potential hazard. Patients on the higher dosage should be hospitalized; those on the lower dosage may be ambulatory, but should be closely observed (*100*).

Isopentaquine

6-methoxy-8-(4-isopropylamino-1-methylbutylamino)-quinoline



Synonyms: SN 13,274.
Salt: mono-oxalate (74.79 percent base).
Dosage:
  Therapeutic: Same as that of pentaquine.
  Suppressive: Not used

Isopentaquine is a close analogue of pentaquine. When given concurrently with quinine it is equal to pentaquine in reducing the relapse rate of experimental vivax infections and is somewhat less toxic (*101*). It is not commercially available.

Conclusions

Most of the newer compounds have not been studied under sufficiently varied conditions to warrant final conclusions as to their relative merits, but several of them appear to be superior to either quinacrine or quinine. The data at hand permit the following conclusions:

1. *Treatment of acute attacks of malaria.* Quinine, quinacrine, chloroquine (and analogous 4-aminoquinolines) and chlorguanide, when given in adequate dosage, will nearly always stop acute attacks of malaria. Choice of drug, therefore, depends upon such factors as rapidity of effect, incidence of side-actions, length of treatment period, incidence of falciparum relapses, latent periods before vivax relapses, natural or acquired strain-resistance, and the cost and availability of drug. Chloroquine is superior in most of these respects and is currently regarded as the drug of choice for routine therapy.

2. *Suppression of malaria.* The aforementioned drugs, when given in properly spaced doses, will usually keep malaria latent under conditions of exposure in the field or following therapy of an acute attack. Choice of drug depends upon the incidence of break-throughs and of undesirable side-actions, the required frequency of dosage, and the persistence of protection if doses are missed, as well as upon cost and availability. Chloroquine in weekly dosage has proved to be a satisfactory suppressant, but further comparative trials are needed to determine the relative merits of chloroquine, chlorguanide, and the less well known 4-aminoquinolines.

3. *Cure of vivax malaria.* In relapsing vivax malaria, concurrent treatment with quinine and an 8-aminoquinoline, such as pamaquine, pentaquine, or isopentaquine, offers the best chance of radical cure. Pentaquine and isopentaquine afford greater margins of safety between effective and toxic dosages.

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Prevalence of Poliomyelitis in 1948

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Prevalence in the United States Following a year during which the incidence of poliomyelitis was relatively low in the United States, the disease again occurred in widespread epidemic form in 1948.[1] A total of 27,680 cases was reported in 1948, about 2,000 more than was reported in 1946 (table 1), but less than the 29,061 cases reported in 1916 to the Public Health Service by 44 States and the District of Columbia.

Table 1. *Number of poliomyelitis cases and deaths, case and death rates per 100,000 population, and number of cases reported per death in the United States, 1943–48*

Year	Total cases reported	Total deaths registered [1]	Case rate	Death rate	Cases reported per death
1943	12, 449	1, 151	9. 3	0. 8	11. 1
1944	19, 029	1, 361	14. 3	1. 1	13. 3
1945	13, 619	1, 186	10. 3	. 9	11. 4
1946	25, 191	1, 845	18. 0	1. 3	13. 6
1947	10, 734	580	7. 4	. 4	18. 4
1948	27, 680	[2] 2, 140	18. 9	1. 5	13. 0

[1] From reports of the National Office of Vital Statistics.
[2] Based on 10-percent sample by National Office of Vital Statistics.

The morbidity rate in 1916 was 30.2 for this group of States, but only 18.9 for the country as a whole in 1948. Although no final figures are available at the time of writing this report on the number of deaths from poliomyelitis in 1948 for the entire country, a 10-percent sample indicates that the figure will be approximately 2,140, or a death rate of about 1.5 per 100,000 population.

The most extensive epidemic area in 1948 was in the west North Central part of the country (fig. 1), centering in South Dakota but also involving adjacent parts of Minnesota, Iowa, and Nebraska. An epidemic area of lesser extent, and with lower incidence rates (as will be indicated later), was located in North Carolina and a few adjacent counties in South Carolina, Tennessee, and Virginia. Still other epidemic areas were located in New Jersey and Delaware, in Ohio, various parts of Texas, the southern half of California, and Utah.

While California reported the largest number of cases (table 2), its morbidity rate was third highest for the States. On the other

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[1] All morbidity and mortality data for 1948 are provisional. The number of cases and deaths by States was obtained through the courtesy of the various State Departments of Health. Morbidity rates for States were based on provisional estimates of population for July 1, 1948, supplied by the Bureau of the Census. Morbidity rates by counties were based on estimates of population for November 1943, supplied by the Bureau of the Census with the exception of California, which was obtained from a publication by Heller, Brace and Company, New York, N. Y.

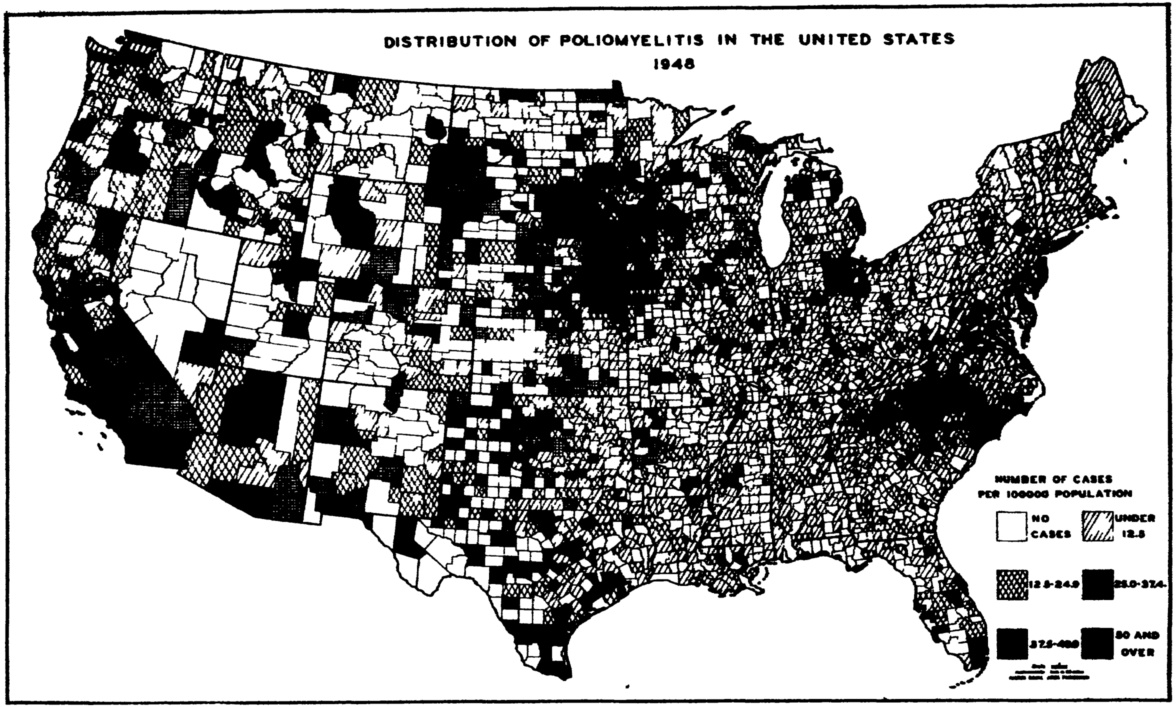
DISTRIBUTION OF POLIOMYELITIS IN THE UNITED STATES
1948
NUMBER OF CASES
PER 100000 POPULATION
NO CASES
UNDER 12.5
12.5-24.9
25.0-37.4
37.5-49.9
50 AND OVER

Figure 1

Table 2. *Number of poliomyelitis cases and deaths reported, case rates per 100,000 population, ratio of cases to deaths, and percent of nonparalytic cases, by States for 1948*

	Number cases	Number deaths	Case rate	Ratio cases to deaths	Percent of cases nonparalytic
New England:					
Maine	40	2	4.4	20.0	27.5
New Hampshire	24	1	4.4	24.0	25.0
Vermont	26	2	6.9	13.0	19.2
Massachusetts	175	----	3.7	----	65.7
Rhode Island	8	0	1.1	No deaths	37.5
Connecticut	121	0	6.0	No deaths	29.0
Middle Atlantic:					
New York	1,399	[1] 23	9.7	[1] 29.2	----
New Jersey	809	42	16.9	19.2	----
Pennsylvania	801	42	7.5	19.0	35.8
East North Central:					
Ohio	1,168	----	15.0	----	----
Indiana	385	29	9.8	13.3	24.7
Illinois	1,103	[2] 57	12.7	[2] 13.8	[2] 55.9
Michigan	770	55	12.4	14.0	44.3
Wisconsin	606	91	18.3	6.6	31.7
West North Central:					
Minnesota	1,378	98	47.0	14.1	48.0
Iowa	1,260	78	48.0	16.1	----
Missouri	319	33	8.1	9.7	----
North Dakota	130	7	13.2	18.5	----
South Dakota	890	101	142.8	8.8	----
Nebraska	717	30	55.1	23.9	----
Kansas	317	26	16.1	12.2	----
South Atlantic:					
Delaware	128	4	43.1	32.0	50.0
Maryland	171	10	8.0	17.1	19.9
District of Columbia	136	3	15.1	45.3	57.8
Virginia	568	26	18.8	21.8	72.5
West Virginia	179		9.3	----	----
North Carolina	2,506	147	67.4	17.0	----
South Carolina	378	16	19.0	23.6	15.0
Georgia	225	7	7.2	32.1	9.8
Florida	285	18	16.3	16.0	----
East South Central:					
Kentucky	201	9	7.1	22.3	16.4
Tennessee	376	----	11.9	----	0
Alabama	206		7.2	----	18.0
Mississippi	162	----	7.	----	----
West South Central:					
Arkansas	146	----	7.6	----	10.0
Louisiana	169	17	6.5	9.9	8.8
Oklahoma	363	33	15.3	11.0	----
Texas	1,765	186	24.4	9.5	----
Mountain:					
Montana	65	8	12.9	8.1	26.1
Idaho	122	5	23.0	24.4	----
Wyoming	82	9	29.8	9.1	26.8
Colorado	125	10	10.7	12.5	0
New Mexico	79	7	13.8	11.3	20.9
Arizona	173	17	26.0	10.2	----
Utah	205	9	32.3	22.8	----
Nevada	19	1	13.4	19.0	----
Pacific:					
Washington	385	35	15.5	11.0	34.3
Oregon	218	12	13.4	18.1	----
California	5,796	----	57.7	----	----

Leaders indicate no data available.

[1] Exclusive of New York City.

[2] Exclusive of Chicago.

hand, South Dakota was ninth in number of cases reported but had the highest morbidity rate, more than double that of any other State.

The reported incidence in certain counties of South Dakota, Iowa, and Nebraska was excessively high. Eight counties in eastern South Dakota, having an aggregate estimated population of 115,000, reported 563 cases or a rate of 490 per 100,000 population. The rates varied in these counties from 333 to 1,090. Beadle County, which had the highest rate in this group, has an estimated population of 16,641 (1943) and reported 181 cases or an attack rate of more than 1 percent. In Harrison County, Iowa, where an epidemic began before the closing of school in May, 93 cases were reported, a rate of 477. The nearest approach to morbidity rates of such order in other epidemic areas was Kimble County in Texas with a rate of 378. In North Carolina and California the maximum rates reported were 270 in Burke County in the former, and 120 in Kern County in the latter.

Seasonal occurrence of poliomyelitis. In 1948, as in previous years, there were striking differences in the seasonal occurrence of poliomyelitis in different parts of the country (fig. 2). The contours of the epidemic curves were also strikingly different in certain of the States reporting large numbers of cases. In North Carolina the epidemic started in April, but in Minnesota and Iowa it began a month to 6 weeks later. However, the general outlines of the curves for these three States are similar. In each instance there was a fairly rapid rise to a peak in 10 to 12 weeks, for the States as a whole, and then a more gradual decline. In Texas there was an increase in incidence in late March, principally in the lower Rio Grande Valley and later in the northern part of the State which accounts for the sustained appearance of the outbreak in that State. Since only a small proportion of this large State had epidemic prevalence, the morbidity rates by weeks were never very high.

In California poliomyelitis became epidemic in late May and June, first in Los Angeles and San Diego Counties and later in more northerly sections, which accounts for a rather flat curve. In South Dakota the epidemic had the appearance of an explosive outbreak, and the peak of incidence was not reached there until late October. The beginning of epidemics at various times in different sections makes the curve for the entire United States somewhat different from other years (1946 for instance, which is shown in figure 2 for comparison). The slight hump in the ascending portion of the curve for 1948 appears to be the result of the early appearance of the disease in North Carolina and Texas. However, the decline seems to have been no different from former years.

Trends in morbidity in certain States. Various statements have been made in recent years to the effect that poliomyelitis is actually increasing in the United States, such assumptions presumably being based on the fact that the total number of cases reported in recent years exceeds that for any previous period. Part of this increase in number is undoubtedly due to a better recognition of cases, more complete reporting, and the inclusion of many more nonparalytic cases (which has been pointed out on numerous occasions in previous reports by the author).

Using only total numbers of cases reported without regard to any of the factors just mentioned, it does appear that incidence is increasing in some States, especially in southern and western sections of the country. However, in other States, particularly in the northeast, the trend of incidence rates over the past 3 decades is actually downward, and in still other States there appears to have been no increase or

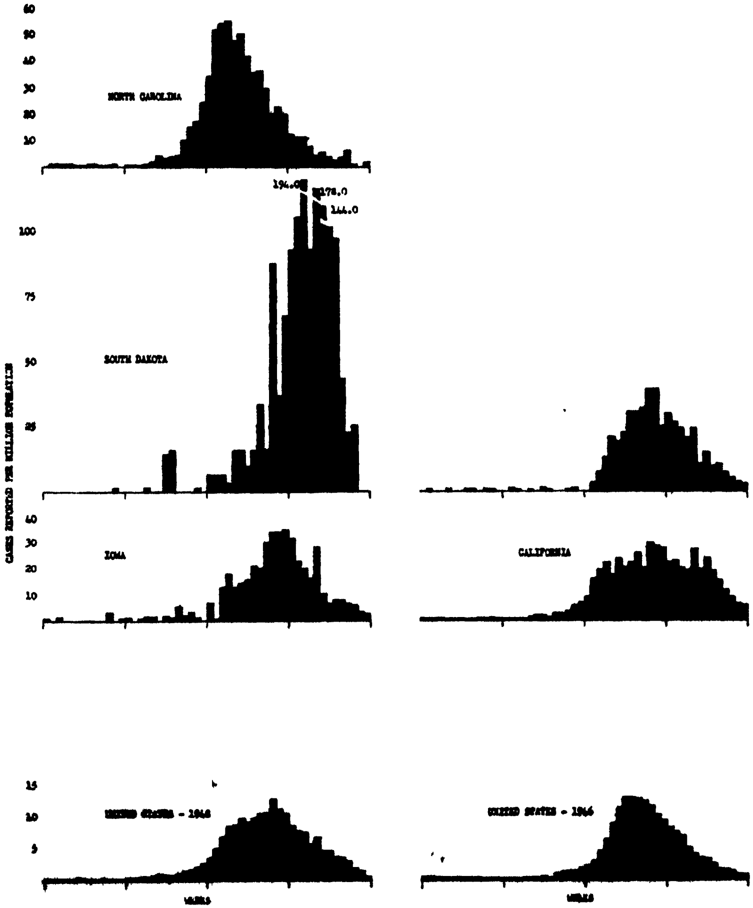

Figure 2. Poliomyelitis morbidity rates per million population by weeks in eight States in 1948 and in the United States in 1946 and 1948.

decrease. The trend of incidence rates is shown (fig. 3) for several States selected to show different types of trends. For instance, in Massachusetts and Vermont the general trend has been definitely downward, and in Kansas and California the opposite sort of trend is apparent. In Pennsylvania and Maryland the downward trend is evident but less marked as compared with Massachusetts, and the upward trend in Michigan and Mississippi is slight compared with Kansas and California.

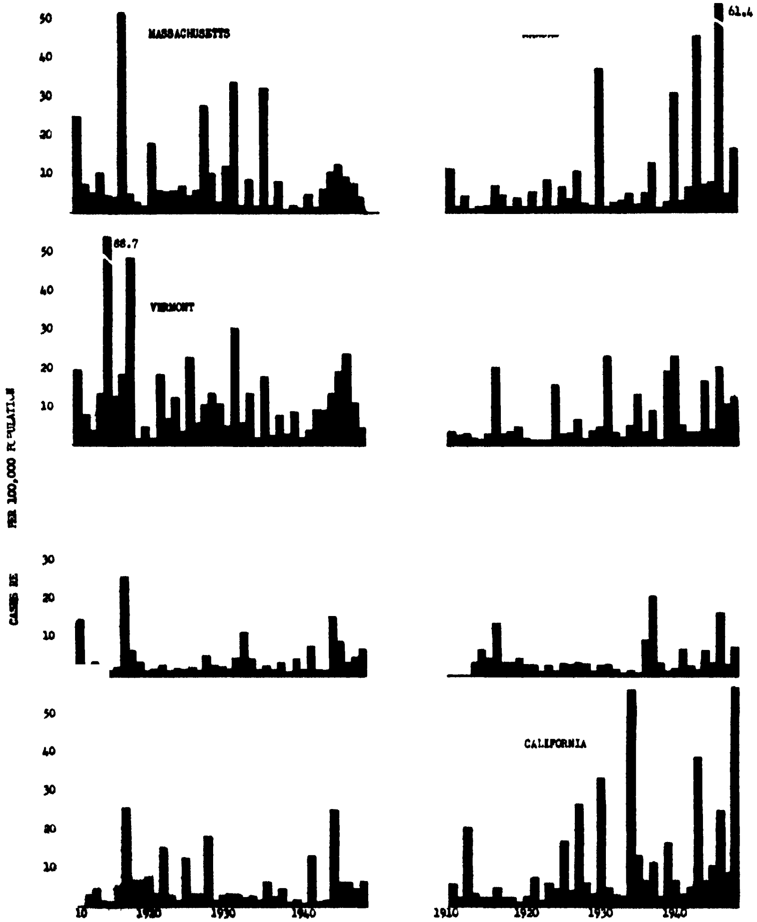

Figure 3. Poliomyelitis morbidity rates per 100,000 population by years in eight States, 1910–1948.

In previous reports the author has used the ratio of cases reported to deaths registered as an index of relative completeness of reporting of poliomyelitis. It is worth noting that these ratios have shown similar changes in States which show upward trends in incidence when compared with those having downward trends. Thus, in Kansas the ratio of cases reported to deaths registered increased from 3.1 (1910–19) to 10.7 (1937–46), and in California the ratio increased from 3.5 to 14.2 in a similar period of time. On the other hand in Massachusetts the ratio changed from 4.5 to 17.0, and in Vermont from 5.5 to 10.1 in the same periods of time, which suggests that completeness of reporting probably does not explain the downward trend in some States as compared to the upward trend in others.

Prevalence in foreign countries. Poliomyelitis was epidemic in various parts of the world in 1948. An outbreak occurred in April in the Reynosa district in the lower Rio Grande Valley of Mexico, which is opposite the area in Texas where the disease first began to appear late in March. Twelve cases with 1 death were reported in the Reynosa district up to May 26. Incomplete reports indicate that the disease was prevalent later in Mexico City, 15 cases being reported during the week ending November 6. Reports from Maracaibo, Venezuela, where 8 cases were reported in 1 day during May, suggests that an epidemic occurred in that area. The capital of Nicaragua also reported a number of cases in December 1948.

In New Zealand an epidemic began in November 1947 which normally is the season when the disease is most prevalent. From November 1947 to March 1948, 303 cases with 18 deaths were reported. However, the prevalence continued to be relatively high throughout 1948—1,170 cases with 50 deaths being reported. In the Auckland area, it was reported that the ratio of suspect to positive cases was 300 to 1, and the ratio was higher in persons 15 and over than in those under 15 years. A slightly higher percentage of cases was under 5 years of age (30.6 percent) in the Auckland area than was reported for all of New Zealand (24.4 percent). About 36 percent of 275 cases reported between November 1947 and March 1948 were classified as nonparalytic. The disease also was prevalent in Australia during 1948, 460 cases being reported from January through September.

An outbreak was reported in the Netherlands Indies. The 51 cases with 5 deaths between August and November were said to have occurred in all races but principally in children. In 1946, 198 cases of poliomyelitis were reported in the Netherlands Indies. In Singapore, 138 cases with 21 deaths were reported from April 17 to October 30, 1948. Of 76 cases reported up to May 25, 30 were adults: 13 European, 11 Chinese, 3 Malay, and 1 each for Indians, Eurasians, and

Ceylonese. Among the 46 cases in children, 31 were Chinese. In the Federated Malay States, 133 cases with 11 deaths were reported in 1948 from May through October. At the same time there was an increase in incidence in Ceylon, 145 cases with 8 deaths being reported from May 23 to October 23, with 30 additional cases in the following 2 months. Late in 1948 and extending into 1949, an increase was reported on the Island of Mauritius. The last previous epidemic on this island occurred in 1945.

Iceland reported poliomyelitis to be prevalent in 1948, principally in one district where 125 cases were reported through November.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDING MAY 21, 1949

A total of 101 cases of poliomyelitis was reported during the week, as compared with 85 last week, 126 for the corresponding week last year, and a 5-year (1944–48) median of 47. The largest increase, 14 cases last week to 42 currently, occurred in Texas. The 4 other States reporting more than 3 cases each are California 11 (last week 9), Mississippi 5 (last week 1), Louisiana 5 (last week 4), and Colorado 4 (last week 1). In Oklahoma, where 8 cases occurred last week, only 3 cases were reported currently. The total reported since March 19 (average seasonal low week) is 541, as compared with 589 for the same period last year and a 5-year median of 299.

The reported incidence of measles declined for the country as a whole and in all geographic divisions except for an increase in the Middle Atlantic area from 6,154 cases last week to 6,878 currently, and slight increases in the West North Central and Mountain areas. The total to date is 481,500, 5-year median 393,154.

Of 26 cases of Rocky Mountain spotted fever reported (last week 22, 5-year median 14), 12 occurred in the South Atlantic area (6 in Virginia), 6 in the Mountain area, 4 in the North Central, 3 in the South Central, and 1 in California The total for the year to date is 83. The largest comparable figure of the past 5 years is 56, reported in 1946.

During the current week five cases of smallpox were reported, three in Missouri and one each in Wisconsin and Colorado. Two cases of anthrax were reported in New York.

The current figures for diphtheria, meningococcal meningitis, scarlet fever, typhoid fever, and whooping cough are well below the respective 5-year medians.

Deaths recorded during the week in 94 large cities in the United States totaled 8,871, as compared with 8,973 last week, 8,781 and 8,956 for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,894. The total for the year to date is 193,305, as compared with 197,402 for the corresponding period last year. Infant deaths during the week totaled 592, as compared with 611 last week and a 3-year median of 639. The total to date is 13,070, same period last year 13,762.

Telegraphic case reports from State health officers for week ended May 21, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis infectious	Influenza	Measles	Meningitis meningococcal	Pneumonia	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever •	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine			1	344		19	1		4			2	23	
New Hampshire			1	69		1							5	
Vermont			3	76					7					
Massachusetts	11			545	3				155				117	
Rhode Island				80		2			12				2	
Connecticut	1			936	2	31			21				6	
MIDDLE ATLANTIC														
New York	5	2	[e]3	2 461	9	392	2		[d]190			3	173	5
New Jersey	3		5	2 052	1	57			87			1	69	1
Pennsylvania	2		(e)	2 565	9		2		173			2	97	6
EAST NORTH CENTRAL														
Ohio	3		1	1 840	1	54	1		162			3	67	12
Indiana	4	2		154	1	6		1	32		1	1	21	20
Illinois	3		6	240	5	80	2	1	80		3	1	58	2
Michigan •	2	3		602	2	42	2		200			2	36	
Wisconsin		1	1	2 163	2	1			41	1			26	
WEST NORTH CENTRAL														
Minnesota	1			165	1	11	1		25			2	2	
Iowa	3			1 133		1	1		16				4	14
Missouri		1	1	142		17	2	2	26	3			3	
North Dakota			10	79			1		2				2	0
South Dakota	1			106					2					
Nebraska			4	310	1	2			13			2		
Kansas			14	334		12			8		1			
SOUTH ATLANTIC														
Delaware				40					5					
Maryland •			2	141		57			[d]32				12	
District of Columbia	1			57	1	6			5			1	2	
Virginia	2		65	608	1	26		6	6		1	4	49	3
West Virginia	2		14	89		4			11			1	16	
North Carolina	2			636	3		3	2	16				14	
South Carolina	8		242	529		100		3			1	4	25	4
Georgia	3		16	295		31		1	10		2	1	5	9
Florida	2			153	4	3	3		4			1	1	

EAST SOUTH CENTRAL														
Kentucky	2	1		240	6	17			19			3	4	18
Tennessee	1		33	312	5	51	1	2	14		1	1	25	
Alabama	3		30	337	1	48	3		2			3	11	10
Mississippi [a]	1		4	57		21	5		6		2	1	3	
WEST SOUTH CENTRAL														
Arkansas	1		26	430		18	2	1	1		5	1	10	
Louisiana	7		2	19	1	4	5		4			1	2	
Oklahoma	2		17	184	1	28	3		2		1			2
Texas	11	2	535	1,275	9	249	42		21			11	135	21
MOUNTAIN														
Montana				306					11				3	
Idaho			18	207		7		1	[d] 9					
Wyoming				13		2		1	2		2	1	3	
Colorado	1			272		21	4	4	8	[2] 1		2		
New Mexico		1	3	149	1	33			4				7	
Arizona	2		38	144	1	23			4				6	
Utah [a]	1	1		99			2		7				37	
Nevada														
PACIFIC														
Washington	1		3	618	1	3	1		22				11	
Oregon	1		7	147	1	18	1		21				20	
California	3	1	8	1,082	4	16	11	1	[d] 80			3	85	3
Total	96	19	1,113	23,635	77	1,505	101	26	1,572	5	20	58	1,197	
Median, 1944-48	205	7	909	22,881	93		47	14	3,421	9	17	70	2,026	
Year to date, 20 weeks	3,112	187	69,850	[1] 481,500	1,668	43,742	[1] 1,464	83	51,005	[2] 43	478	899	20,291	
Median, 1944-48	5,217	166	184,505	393,154	3,379		811	46	69,924	204	356	1,029	42,016	
Seasonal low week ends	(27th) July 10		(30th) July 31	(35th) Sept. 4	(37th) Sept. 18		(11th) Mar. 19		(32nd) Aug. 14	(35th) Sept. 4		(11th) Mar. 19	(39th) Oct. 2	
Since seasonal low week	8,226		106,120	[1] 533,893	2,512		541		73,703	[2] 58		439	30,324	
Median, 1943-48 [b]	12,783		327,208	428,100	4,883		299		108 495	282		554	71,899	

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[a] Period ended earlier than Saturday.

[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944-45 to 1948-49, inclusive.

[c] New York City and Philadelphia only, respectively.

[d] Including cases reported as streptococcal infection and septic sore throat.

[e] Including paratyphoid fever; reported separately, as follows: New York 1; Minnesota 2; Georgia 1; Florida 1; Wyoming 1; Colorado 2; California 2. Salmonella infections, not included, were reported as follows: Massachusetts 1; New York 3.

[1] Delayed reports (included in cumulative totals only): Iowa, measles, March 718 cases, April 492 cases; poliomyelitis 1 case, January onset (not included in total since low).

[2] Deduction: Smallpox, 1 case, Colorado, week ended Apr. 30; diagnosis changed.

Anthrax: New York 2.

Alaska: Pneumonia 4, influenza 4; scarlet fever 2; measles 2, meningitis 1; streptococcal sore throat 2.

Hawaii Territory: Influenza 2; measles 99.

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended March 26, 1949, and 5 weeks ended April 30, 1949.—During the 4 weeks ended March 26, 1949, and the 5 weeks ended April 30, 1949, cases of notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases		Disease	Cases	
	4 weeks ended Mar. 26, 1949	5 weeks ended Apr. 30, 1949		4 weeks ended Mar. 26, 1949	5 weeks ended Apr. 30, 1949
Chickenpox	186	259	Syphilis	147	93
Diphtheria	31	24	Tetanus	3	20
Dysentery, unspecified	3	3	Tetanus, infantile	1	4
Gonorrhea	192	166	Tuberculosis (all forms)	314	540
Influenza	84	72	Typhoid fever	3	1
Malaria	52	44	Typhus fever (murine)	3	2
Measles	86	66	Whooping cough	559	830

DEATHS DURING WEEK ENDED MAY 14, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 14, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	8,973	9,422
Median for 3 prior years	9,390	
Total deaths, first 19 weeks of year	184,434	188,621
Deaths under 1 year of age	611	746
Median for 3 prior years	746	
Deaths under 1 year of age, first 19 weeks of year	12,478	13,172
Data from industrial insurance companies:		
Policies in force	70,402,753	71,062,649
Number of death claims	12,656	12,976
Death claims for 1,000 policies in force, annual rate	9.4	9.5
Death claims per 1,000 policies, first 19 weeks of year, annual rate	9.7	10.3

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended April 30, 1949.—During the week ended April 30, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		21	1	238	581	19	47	45	161	1, 113
Diphtheria				2	1	1				4
Dysentery, bacillary				3					1	4
German measles		3		503	46	2	92	38	20	704
Influenza		77			11	7	100			195
Measles		184	23	128	281	131	113	252	281	1, 393
Meningitis, meningococcal						1				1
Mumps		53	5	75	439	49	16	2	65	704
Poliomyelitis						3				3
Scarlet fever		4	1	91	62	2		9	9	178
Tuberculosis (all forms)		6	13	97	64	24	6	13	70	293
Typhoid and paratyphoid fever			1	14	1					16
Undulant fever				2	1					3
Venereal diseases:										
Gonorrhea		9	15	92	62	44	18	33	51	324
Syphilis		3	9	64	40	4	5	8	9	142
Other forms									1	1
Whooping cough		12		72	18	2	9	1		114

NEW ZEALAND

Notifiable diseases—4 weeks ended March 26, 1949.—During the 4 weeks ended March 26, 1949, certain notifiable diseases were reported in New Zealand as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Cerebrospinal meningitis	4		Poliomyelitis	98	3
Diphtheria	15		Puerperal fever	6	
Dysentery:			Scarlet fever	94	
Amebic	4		Tetanus	1	1
Bacillary	13		Trachoma	2	
Erysipelas	12		Tuberculosis (all forms)	170	34
Food poisoning	15		Typhoid fever	17	
Lead poisoning	1		Undulant fever	3	1
Malaria	2				

CUBA

Habana—Notifiable diseases—4 weeks ended March 26, 1949.—During the 4 weeks ended March 26, 1949, certain notifiable diseases were reported in Habana, Cuba, as follows:

Disease	Cases	Deaths	Disease	Cases	Deaths
Chickenpox	19		Smallpox		
Diphtheria	20		Tuberculosis		
Malaria	1		Typhoid fever		
Measles	16	1			

Provinces—Notifiable diseases—4 weeks ended March 26, 1949.—During the 4 weeks ended March 26, 1949, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	3	21	18	21	2	20	85
Chickenpox		22	15	3	2	42	84
Diphtheria		22	1	1	1	4	29
Leprosy		1					1
Malaria	2	3			1	13	19
Measles		15	1		2	1	19
Smallpox		1					1
Tuberculosis	4	20	5	21	17	14	81
Typhoid fever	4	9	3	6	6	50	78
Undulant fever		1			1	2	4
Whooping cough		20					20

[1] Includes the city of Habana

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Cholera

Siam—Bangkok.—Information dated May 19, 1949, reports an outbreak of six cases of cholera in the city of Bangkok, Siam, with one death.

Plague

Belgian Congo—Stanleyville Province.—Plague has been reported in Stanleyville Province as follows: On March 30, 1949, one fatal case in Gobi, a village west of Blukwa; on April 27, 1949, one fatal case in the village of Pitchu, southwest of Blukwa.

India—Calcutta.—Plague has been reported in Calcutta, India, as follows: Week ended April 23, 1949, 44 cases, 4 deaths; week ended April 30, 42 cases, 5 deaths; week ended May 7, 20 cases, 4 deaths.

Indochina (French)—Cochinchina.—During the period April 1-30, 1949, 21 fatal cases of plague were reported in Cochinchina, French Indochina (including cases of pneumonic plague). During the week ended April 30, 2 cases were reported in Saigon-Cholon.

Portugal—Azores—St. Michaels Island.—During the week ended March 26, 1949, one case of plague was reported at Rabo de Peixe, Ribeira Grande, on St. Michaels Island in the Azores.

Smallpox

Colombia.—During the month of March 1949, 329 cases of smallpox were reported in Colombia.

Ecuador.—During the month of March 1949, 65 cases of smallpox were reported in Ecuador.

Great Britain—England and Wales.—Information dated May 20, 1949, states that on May 11, 1949, two new cases of smallpox were reported at Liskeard in Cornwall. Both cases are said to be contacts of the original case reported there the week before (which proved fatal, and in which contact with cases reported from the *Mooltan* had not been established). These three cases in Liskeard are the only cases reported that have not been definitely traced to passengers or members of the crew of the steamship *Mooltan*, or to direct contacts with them

Ivory Coast.—During the period April 21-30, 1949, 74 cases of smallpox were reported in Ivory Coast.

Java—Batavia.—During the week ended May 14, 1949, 246 cases of smallpox were reported in Batavia, Java.

Typhus Fever

Afghanistan—During the period March 1–31, 1949, 1,191 cases of typhus fever were reported in Afghanistan.

Colombia—During the month of March 1949, 269 cases of typhus fever were reported in Colombia.

Ecuador.—During the month of March 1949, 21 cases of typhus fever were reported in Ecuador.

Pakistan—Northwest Frontier Province.—During the period April 1–30, 1949, 180 cases of typhus fever, with 38 deaths, were reported in Northwest Frontier Province, Pakistan.

Ethiopia.—During the period January 15–February 26, 1949, 115 cases of typhus fever were reported in Ethiopia, 105 of which were stated to have occurred in Shoa Province.

Yellow Fever

No reports of yellow fever were received during the current week.

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Public Health Reports

VOLUME 64 JUNE 17, 1949 NUMBER 24

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New Tools for Professional Cancer Education

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Public Health Reports

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Professional Education for Cancer Control

By Austin V. Deibert, M.D.*

Some 2,000 years ago the Roman physician Celsus taught that cancer could be recognized by the fact that when removed by surgery, it invariably grew back. And the great teacher Galen, in the second century A. D., urged the importance of early diagnosis in cancer, but could offer only palliative therapy.

Although cancer is a disease older than the human race, it has been only in the past 75 years, with the advent of modern methods of surgical and radiation therapy, that actual progress has been made possible in cancer control. Today, the physician can offer not only diagnosis, but also curative treatment.

Progress in cancer control thus depends on the physician, dentist, or nurse, and particularly on the first person in these professions who has an opportunity to observe and suspect the existence of malignant growth. For this reason, professional cancer education has become an urgent public health problem. The physician and allied professions must be provided with information that will permit them to suspect or recognize possible early signs of cancer.

The four articles appearing in this issue of Public Health Reports provide a survey of the National Cancer Institute program for cancer information. Annual grants to medical schools aid the coordination of cancer subjects and improvement in cancer teaching through increased use of visual aids, clinical observation, and other methods. Through annual grants to dental schools, corresponding efforts are being made to equip undergraduate dentists with a better understanding of cancer and a sound background in oral diagnosis. Federal funds also provide a limited number of clinical traineeships which are granted to aid physicians in the acquisition of knowledge and experience in cancer care. And, finally, the National Cancer Institute is developing a series of teaching tools, including films, slides, manuals, pamphlets and articles, designed for use in professional information programs throughout the country.

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*Chief, Cancer Control Branch, National Cancer Institute.

National Cancer Institute Program of Postgraduate Training for Physicians

By R. R. Spencer, M. D.*

Medical and other groups concerned with the cancer problem have long been aware of the need for more training for physicians in this field of medicine. To help meet this need, the Public Health Service was given authority in the National Cancer Institute Act of 1937 to conduct a postgraduate education program in cancer diagnosis and treatment.

This program, initiated in 1938, has been carried out through postgraduate clinical traineeships, of which a limited number are awarded annually to young physicians. Appointments are made for 1 year, with the opportunity for yearly renewals for two additional years. The stipend has been increased from $6 per day in the early years of the program to $10 at the present time, in conformance with changing economic conditions. The actual training is provided by cooperating medical schools and hospitals. The applicant is required to make his own arrangements with an acceptable institution before the traineeship is granted. This provision permits the trainee to select his own training center and the institution to select its own trainees.

The number of appointments, including renewals, has ranged from 3 in the fiscal year 1938 to 85 in the fiscal year 1948. Restricted at first by the size of the Institute's appropriation, then by the limited number of suitable applicants available during the war years, the program has expanded considerably since 1946.

Nearly 10 years have elapsed since the program was started, and enough experience has been accumulated to warrant a review of its accomplishments. In the spring of 1948, questionnaires were sent to all trainees who had ended their training before April 1, 1948. Information contained in this report summarizes the status of former trainees at the time of their replies, which were made during April–July 1948.

Scope of the Study

The data included in this study represent the experience of 111 former trainees, 110 men and 1 woman. The first trainee was appointed in January 1938 and served for 1 year. Thus the period of time elapsed from the end of traineeship to the date of reply to this questionnaire ranges from 9 years to only a few months.[1]

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[1] Up to April 1, 1948, the total number of appointments was 201. Seventy-four were still in training Four did not reply to the questionnaire. The remaining 12 were not included in the study because of death or early discontinuance of training for special reasons such as military service.

Qualifications of Trainees

The minimum qualifications of applicants for traineeships are graduation from an approved medical school and at least 1-year rotating internship. Of the 111 trainees, 107 offered experience exceeding these minimum requirements. Eight appointees had only 1 to 3 years' postgraduate experience, but 49 had 3 to 5 years and 50 had 5 or more years of postgraduate training and experience.

Length of Traineeship

The general policy has been to appoint trainees for not less than 1 year, and to continue appointments for not more than 3 years. In some cases, trainees ended their appointments previous to the expiration date. However, only 26, or approximately one-fourth of the group, were in training less than 1 year. Nearly half of these were offered positions before the end of their appointment and five were called into military service; others had wanted only a short period of training or had been forced to resign because of personal circumstances In only one case did there appear to be dissatisfaction with the course. Eighty-five appointments were extended for a second year, and 43 were extended for a third year. In one exceptional case, an appointment was extended beyond the 3-year period.

Obviously the length of the traineeship alone does not give the complete story of the trainee's postgraduate work, but must be considered in conjunction with his pretraineeship experience. In some instances, those who spent short periods of time in the National Cancer Institute traineeship had already gone through long periods of training. The study shows that 91, or more than four-fifths of the trainees, had 5 or more years of postgraduate training at the time that they terminated their traineeships, and that 15 had 10 or more years of training. Of the 20 who had less than 5 years, 7 reported that they were continuing their training after the expiration of the National Cancer Institute appointment.

Institutions Providing Training

The program of clinical training in cancer diagnosis and treatment would not have been possible without the cooperation of medical educators and heads of teaching institutions. The institutions which have provided the training for the 111 persons included in this study are shown in the list below. Ninety-six physicians took all of their training under this program at a single institution; 15 attended two or more institutions.

Institution providing training	*Number of Trainees*	
	All of training	*Part of training*
American Oncologic Hospital, Philadelphia, Pa	1	------
Barnard Free Skin and Cancer Hospital, St. Louis, Mo	4	------
Bellevue Hospital, New York, N. Y.	7	2
Cincinnati General Hospital, Cincinnati, Ohio	1	1
Chicago Tumor Institute, Chicago, Ill	2	2
Cook County Hospital, Chicago, Ill.	----	1
Duke Hospital, Durham, N. C.	4	1
Ellis Fischel State Cancer Hospital, Columbia, Mo	1	------
Hospital of the University of Pennsylvania, Philadelphia, Pa	4	1
Jeanes Hospital, Philadelphia, Pa.	-----	1
Johns Hopkins Hospital, Baltimore, Md	-----	1
Lahey Clinic, Boston, Mass	- ---	2
Massachusetts Eye and Ear Infirmary, Boston, Mass	1	------
Massachusetts General Hospital, Boston, Mass	2	------
Massachusetts Memorial Hospital, Boston, Mass	2	1
Mayo Clinic, Rochester, Minn	-----	1
Memorial Hospital for the Treatment of Cancer and Allied Diseases, New York, N. Y	31	7
Michael Reese Hospital, Chicago, Ill	2	------
Mt. Sinai Hospital, New York, N. Y	1	2
New England Deaconess Hospital, Boston, Mass	-----	1
New Haven Hospital, New Haven, Conn	3	------
Palmer Memorial Hospital, Boston, Mass	-----	1
Pondville Hospital, Wrentham, Mass	-----	1
Presbyterian Hospital, New York, N. Y	1	1
Strong Memorial Hospital, Rochester, N. Y	1	------
State Institute for the Study of Malignant Disease (now The Roswell Park Memorial Hospital), Buffalo, N. Y	-----	2
University of California Hospital, San Francisco, Calif	2	1
University of Illinois College of Medicine, Chicago, Ill	-----	1
University of Maryland, Baltimore, Md	1	1
University of Michigan, Ann Arbor, Mich	11	1
University of Minnesota Hospitals, Minneapolis, Minn	12	1
University of Pennsylvania Graduate School of Medicine, Philadelphia, Pa	-----	1
Veterans Administration Hospital, Hines, Ill	-----	2
Warwick Memorial Clinic for Cancer and Allied Diseases, Washington, D. C	1	------
Wayne University Medical School, Detroit, Mich	1	-- ---

Other institutions that have in the past or are now cooperating in the program are: Allentown General Hospital, Allentown, Pa.; Emory University Hospital, Emory University, Ga.; Freedmen's Hospital, Hospital, Washington, D. C., Georgetown University Medical School, Washington, D. C.; Huntington Memorial Hospital, Boston, Mass.; Iowa University College of Medicine, Iowa City, Iowa; Nix Hospital, San Antonio, Tex.; North Carolina Baptist Hospital (Bowman-Gray Medical School), Winston-Salem, N. C.; Norton Memorial Infirmary, Louisville, Ky.; Philadelphia General Hospital, Philadelphia, Pa.; Provident Hospital and Training School, Chicago, Ill.; Swedish Hospital, Seattle, Wash.; University of Tennessee College of Medicine, Memphis, Tenn.; and Washington University Medical School, St. Louis, Mo.

Results of the Program

The ultimate goal of the program of postgraduate education in cancer must be the provision of better care for the patient. Although the persons appointed to these traineeships indicated their intention to engage in some phase of cancer work when their training was completed, they were not required to sign any agreement to this effect. It is encouraging to learn, therefore, that they seem to be carrying out their original intentions as far as circumstances will permit. A large proportion of the trainees have demonstrated their competence in those branches of medicine which at present provide the major part of the services for the cancer patient, and most have established themselves in a type of practice or in positions where their special training is of benefit to the cancer patient, either directly or indirectly.

Diplomates of Specialty Boards

Seventy-three of the 111 trainees reported that they had completed board examinations in branches of medicine where they will probably be called upon to treat large numbers of cancer patients.

33 are diplomates in radiology.
32 are diplomates in surgery (one of these is also a diplomate in neurosurgery).
5 are diplomates in pathology.
2 are diplomates in obstetrics and gynecology.
1 is a diplomate in oral surgery.

Thirty-three others were either planning to take the board examinations in their specialties or had already passed part of the examinations. The specialties are as follows: 20 in surgery, 7 in radiology, and 1 each in pathology, otolaryngology, ophthalmology, internal medicine, physical medicine, and orthopedic surgery.[2]

Teaching Positions

Twenty-eight trainees reported that they were engaged in teaching at medical and dental schools. Three were professors, 2 were associate professors, 7 were assistant professors, and 12 were instructors. Four did not state what positions they held. It seems probable that many other trainees, by virtue of positions held in hospitals and clinics, have many opportunities for teaching.

Hospital Positions

All but a few of the trainees were on the staff of at least one hospital, and a large number held several staff positions. One was director of the tumor, research, and educational hospitals of a State university medical school, and another was director of a city hospital. Sixteen were section chiefs, directors, or chairmen of hospital departments. Ten were consultants in their specialty. Others listed such positions as director of laboratories, surgeon, pathologist, radiologist, oncologist, or associate in one of these specialties. A few held positions in group practice.

Positions in Cancer Clinics

Forty-seven trainees were on the staff of a cancer diagnostic clinic, 55 were on the staff of a cancer clinic, and 27 were on the staff of a cancer detection center. Six trainees were directors of clinics, two were acting or associate directors. There is duplication in these figures, as many of the men were on the staff of more than one type of cancer service, but a total of 69 were active in one or more such services.

The remaining 42 were not on the staff of any type of cancer clinic. Of these, two were in the Army, five were continuing their training, some had only recently entered practice, and others were located in areas where cancer clinics had not yet been organized.

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[2] Information on this point was not obtained from one trainee who is still in military service. Of the remaining four responding to the questionnaire, one is a fellow of the American College of Surgeons, one is a fellow of the International College of Surgeons, one is in general practice, and one was forced by personal circumstances to terminate his traineeship at the end of a few months.

Time Devoted to Cancer Work

The fact that so many trainees were on the staffs of cancer clinics and services is a partial index of how the traineeship program aids the cancer patient. Further information on this point was obtained through the trainees' estimates of the percentage of their time now devoted to work with cancer patients.

Ten trainees reported that they were devoting all of their time to cancer work. Thirty-three trainees spent at least half of their time on cancer patients, while 28 spent a quarter to a half of their time on such work, and 29 spent less than 25 percent of their time on cancer. In 11 cases, the trainees were still training, serving in the armed forces, or engaged in other types of work.

Location of Trainees by States

The trainees are distributed over 29 States and the District of Columbia. As might be expected, New York had attracted the largest number. Thirteen trainees who served their traineeships in New York City hospitals had located in New York State, all but one in or near New York City. California ranked second with 9 trainees, none of whom trained in that State. Minnesota was third with eight trainees, all of whom received their training at the University of Minnesota.

Trainees' Comments and Suggestions

Physicians who have had the experience of serving in National Cancer Institute traineeships and of putting this training into practical use are probably in the best position to know the merits and shortcomings of the program. Accordingly, the questionnaire asked trainees to offer comments and to make suggestions for future improvement. The consensus was that training received under the program had been excellent and highly valuable to the trainees in their professional careers. Several said that, without this financial aid, they would not have been able to continue specialist training.

Among the suggestions made by trainees were the following: Surgeons working in the cancer field should have basic training in cancer pathology and in radiation therapy; more extensive training in surgery should be a prerequisite for a traineeship; a part of the training period should be devoted to cancer research.

One physician suggested that training should include "the problem of the so-called terminal case in order to encourage any and all specialists who accept responsibility for definitive cancer care to accept also the same responsibility for the terminal care of the same patients if treatment is unsuccessful"; and that preference be given to training programs in centers with active cancer services where a large number of cases are handled by a small, capable, and experienced group.

Two suggestions call for greater participation by departments of internal medicine in the study and teaching of cancer diagnosis and therapy.[3] One trainee suggested broadening the training program to include chemotherapy, "which often falls within the department of medicine." Another suggested that training in the diagnosis and treatment of cancer be given to men specializing in internal medicine in order to encourage the study of cancer as a systemic disease.

Trainees also proposed that a certificate be issued as evidence of successful completion of the training period;[4] that assistance be given in placing trainees in suitable locations; that trainees be sent a semiannual circular summarizing the latest developments in clinical cancer research; and that an annual refresher course be given for former trainees.

The need for a larger number of adequately trained physicians in the cancer field was mentioned in many replies. A few commented upon the dearth of such persons in some of the less urbanized areas.

Present Status of Program

As of February 1, 1949, the National Cancer Institute had made 231 trainee appointments since the inception of the program; 68 of these were still active. In the current fiscal year 1949, the Institute could grant appointments to only about one-fourth of the applicants, many of whom were well qualified. An encouraging development, which will help fill this demand for postgraduate training in cancer, was the recent establishment by the American Cancer Society of 40 training fellowships, similar to those of the National Cancer Institute.

Conclusion

This analysis provides a basis for evaluating, to some degree, the program of postgraduate education carried on by the National Cancer Institute and cooperating institutions during the period 1938 to 1948. During approximately 8 years of this period, war conditions interfered seriously with the normal conduct of medical education and with this program. The type of training, the quality of the training, the facilities and clinical material, and the teaching ability of the various staffs, have, of necessity, varied in the 31 institutions that accepted trainees. In spite of these factors, we believe that the program has been successful in achieving its objective—the provision of better cancer services and a more intelligent management of the cancer patient.

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[3] These suggestions are in harmony with ideas already advanced by many physicians working with cancer patients and by medical educators. See "Cancer in the medical school curriculum," a report by the National Advisory Cancer Council, J. Nat. Can. Inst. 8: 3 (1947).

[4] This suggestion has now been put into effect.

Physicians who have completed these traineeships have received special clinical training in the diagnosis and treatment of cancer. They have become more proficient in dealing with this disease in their own patients, and are better qualified to teach other physicians.

Data obtained from 111 trainees indicate that they have generally demonstrated a high degree of proficiency in their work. Seventy-three had become diplomates of one of the specialty boards, and 33 were planning to take qualifying examinations at the time of the questionnaire. Most of these specialists are in the fields of surgery, radiology, and pathology.

Nearly one-fourth of the trainees are devoting 75 to 100 percent of their time to work with the cancer patient. Nearly two-thirds are serving on the staffs of cancer clinics or detection centers Many trainees hold important positions on hospital staffs. More than one-fourth are now teaching in medical or dental schools.

Those who may be considered permanently located have settled in 29 States and the District of Columbia, thus providing service to cancer patients in many different sections of the country.

As a result of their experience, both as trainees and as practicing physicians, those answering the questionnaire have made a number of suggestions which merit the serious consideration of medical educators.

The fact that such a large proportion of the trainees have qualified or plan to qualify as diplomates in surgery, radiology, or pathology suggests the need for a new development in this educational program, i. e., the provision of postgraduate training in cancer for the internist. There is a growing recognition of the role the internist could and should take in the management of the cancer case. He is the person who should be prepared to provide systemic treatment for the patient during and following surgical and radiological treatment; he is also the logical person to provide care for the case which is only temporarily arrested. There is evident need, therefore, to expand the postgraduate education in cancer to include special training for physicians who expect to devote themselves to the practice of internal medicine.

The need for better training in the cancer field is generally recognized. The postgraduate training program of the National Cancer Institute has assisted many physicians in taking such training. It is hoped that such programs may be expanded and that cooperating institutions will continue to improve their own programs for specialized training in the management of cancer cases.

Cancer Teaching in Medical Schools

By RAYMOND F. KAISER, M. D.*

Cancer claims more American lives every year than any disease except heart disease. The mortality rate from cancer might be lowered by 30 percent if the people were more alert for signs and symptoms of the disease, and if physicians were better prepared to discover and give earlier treatment to potentially curable cancers.

During the year, most physicians, however, see about three or four cases of cancer. The likelihood of increasing his familiarity with the disease by postgraduate study is limited by the shortage of facilities for such study. This places an exceptionally heavy responsibility on medical schools to give undergraduate students thorough cancer instruction and an appreciation of clinical research, and to bring to them the latest methods of diagnosis and therapy.

It was against this background that the 6 members of the National Advisory Cancer Council of the National Cancer Institute met in 1946 with 22 medical school deans and educators to discuss the problem of cancer teaching. They agreed that substantial improvements could be made. The conferees recommended that: (1) the deans and faculties of medical schools survey their teaching of cancer; (2) consider introducing integrated courses in the disease; (3) stimulate cancer research in their schools, not only for itself, but as an aid to teaching and a stimulant to student interest, and (4) that the Public Health Service find a way to provide financial assistance to improve cancer instruction in the schools.

To support these recommendations, Congress made available $1,500,000 to the National Cancer Institute in the fiscal year 1947-1948 for grants to coordinate the teaching of cancer in medical schools. These funds were increased to $2,250,000 in the fiscal year 1948-1949.

Since the first funds were allocated in June 1947, all but six of the medical schools in the United States have applied for and received grants ranging to $25,000 a year. Today, 73 schools of medicine are participating in this grant-in-aid program.

In this short space of time, there is indication that the schools using this financial assistance have been able to develop and enhance their teaching programs. Although the subject of cancer is old, organization and teaching of the subject are still in the process of development, with many critical studies being conducted in teaching techniques and methods.

In making application for a renewal of a Federal grant, the medical school describes what it is doing, and what it intends to accomplish in developing its curricula. From current applications, there emerges a panorama of this frontier in medical education.

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The Starting Point

The initial problem springs out of the unique character of cancer itself. The disease, a protean one, may arise in any part of the body. Therefore, it does not fall completely within the province of gynecology, surgery, or any other single department of the usual medical school organization. The first problem, then, is whether to teach the subject "horizontally" (by simply expanding and strengthening the teaching of cancer as it occurs within the context of traditional subjects) or "vertically" (by making cancer itself the subject of a separate course of instruction).

Horizontal Teaching

By far the more common solution is to adopt the horizontal method. It least disturbs existing curricula and departmental organization, and makes the least demand for new teaching manpower.

The task of providing a new accent on cancer in the teaching of traditional subjects is often entrusted to a single faculty member. He may be called a professor of oncology, a director or a coordinator of cancer activities. Frequently he has the status of a full professor, and has the same security in his position as other members of the faculty.

With his over-all perspective of the problem, the coordinator can help insure that the cancer instruction in the various departments is complete and well balanced, and that it proceeds during the teaching year in logical and orderly fashion. He also can serve as a link between departments to see, for instance, that clinicians are aware of developments in basic science departments that might apply to clinical problems, and vice versa.

However, the cancer coordinator usually gives most of his time to the department with which he is officially affiliated. Accordingly, some schools have set up committees to coordinate the teaching of cancer within the various departments. Such a system, with the chairman serving as the cancer coordinator, has been adopted at the University of Cincinnati, the University of St. Louis, Stanford University, and the University of Maryland.

These committees are composed of representatives of the departments most concerned with cancer. They are more able than the single coordinator to integrate instruction in all departments, and to relate it to teaching in tumor and detection clinics. Obviously, too, the committee members have a more detailed knowledge of what is being taught in their departments and how it might be developed; they also can enlist the cooperation of their departments more easily.

Vertical Teaching

The establishment of a single department or section for the teaching of cancer recognizes the systemic character of the disease. It brings to the medical student a coherent and complete picture of cancer as an entity, and not merely as a topic that occurs in other branches of medicine such as surgery and gynecology. Among the schools that use the vertical plan are Hahnemann Medical College, Cornell Medical College, the University of Utah, and Georgetown University Medical Center.

The vertical plan apparently fits best into the fourth-year curriculum. Here the student has a basic science background, some clinical experience and greater familiarity with medicine in general—all essentials for understanding the complexities of cancer. Beyond that, the student in his last year, is able to draw together the fragments of cancer knowledge acquired during the earlier years of medical school.

Other Methods

Some medical schools offer interesting blends of the horizontal and vertical systems. The University of Southern California, for example, uses what it calls a "symposium" technique. It has organized a single course on cancer, which is taught, however, by instructors from the traditional departments of the school. At Columbia University's College of Physicians and Surgeons, where this blend is also in use, it is referred to as an "oblique" teaching method incorporating demonstrations rather than symposia.

At the University of Colorado, a similar method is in operation. From the vertical standpoint, an oncologist, with the rank of assistant professor of surgery, directs the program which is located in the department of surgery. As executive director of the department of oncology, he is responsible for administration of the program, direction of the weekly tumor conference, instruction to students and participation in treatment and follow-up of cancer patients.

Horizontally, the Colorado medical school adheres to the policy of departmental autonomy in the care and treatment of cancer patients. That is, the tumor clinic has no patients of its own. To illustrate: a case of carcinoma of the bladder would be cared for by the genitourinary department, including therapy and follow-up. For this purpose, each department is assigned specific days in the tumor clinic.

There are many other variations which blend some of the features of both horizontal and vertical teaching. The cancer teaching program at Tufts College Medical School was set up as a cancer research and cancer control unit in the department of surgery, and directed by a research professor of medicine. Establishment of a full-time cancer research unit was thought to be a necessary prerequisite to stimulate cancer teaching, and such a unit was set up followed closely by initiation of the teaching program. Vertically, the program has a single director in a single department; but instruction is horizontally applied from many departments concentrated in an 8-day course for fourth-year students.

Curriculum Content

The amount of time devoted to cancer instruction varies greatly from one medical school to the next and so, to a lesser extent, does the content and style of the teaching itself. Since cancer is a phenomenon of growth, however, it is not uncommon to begin classroom consideration of the subject—as at Hahnemann—within the field of biology. From there instruction may go on to consider the special problems the disease may present to the gynecologist, the pathologist, the radiologist, the surgeon, and so on. A suggested minimum course in cancer, drawn up at the University of California, is presented in the following summary outlined.

I. General Introductory
  a. Epidemiology: incidence of cancer; cancer research.
  b. General biologic phenomena of cancer, including metastases.
  c. Metabolism of the cancer patient.
  d. Diagnostic methods; biopsy, cytological, biochemical, X-ray and radioactive tracers.
  e. Pre-cancerous lesions.
  f. Principles of radiotherapy of cancer; isotopes.
  g. Principles of surgery.
  h. Principles of chemotherapy.
II. Pathology of cancer.
III. Tumors of all organs and systems.
IV. Tumors in children.
V. Rare tumors; glomus tumors.

Tumor Clinics

Cancer instruction is not complete without clinical teaching. Tumor clinics, where the student may see actual cancer patients, are a prime aid, used by nearly all of the medical schools receiving financial assistance.

Basically, the procedure of clinical instruction gives the students an opportunity to follow the instructor through each detail of an individual case, taking history, thorough examination of the lesion, performing routine and special laboratory tests, roentgen studies and biopsies. After the patient is dismissed, the case is discussed with the students. Diagnosis and therapy are determined by joint decision of the surgeon, the radiologist, the pathologist and consultants from the medical school department most appropriate to the case. For example, a dermatologist may be called in a skin cancer case, or a gynecologist in a cervical cancer case.

While their emphasis is on instruction in diagnostic and curative measures, most clinics also offer training in the terminal and palliative care of advanced cancer patients, with special attention to the problems of alleviating pain by the administration of drugs. Follow-up services maintained by the clinics also help acquaint the student with the need for continued observation of treated cases, serving primarily to return patients to the clinic in an effort to uncover recurrences.

Students in most schools spend only a short period of their third and fourth years in the tumor clinic. To enable them to follow clinical procedures closely, the "small group" method of instruction is generally practiced. Clinic sessions are usually limited to 6 to 10 students at a time, enabling intimate association with the care of patients and with diagnostic and therapeutic techniques.

A few schools have made the tumor clinic the focal point of their cancer instruction. They include George Washington University, the University of Georgia, New York University, the University of Arkansas, and the University of Colorado.

The Yale Method

A good example is offered by Yale University. The tumor clinic at New Haven has been in operation since 1929. The 10-year-old tumor registry includes records of New Haven Hospital cases over the past 25 years. Yale has largely abandoned instruction by formal lecture; its medical faculty is convinced that "the most effective form of teaching is that which demands a large measure of participation and initiative on the part of the student."[1] Clinical instruction at Yale is patterned on this principle

While serving clerkships (third and fourth years) in surgery or its specialized branches, the students see cancer cases of all types in the clinic. Because a relatively large number of cancer patients are admitted to the general surgical service, they have been concentrated in a separate tumor subdivision, supervised by the cancer coordinator. This subdivision provides a major source of cancer instruction. One teaching period each week is devoted to study of malignant tumors by small groups of clerks in general surgery.

The clinical clerk in general surgery serves one week in the tumor and detection clinic. Here the student sees about 100 ambulatory patients in all stages of malignant disease and learns detection methods of cancer.

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[1] Syllabus: Cancer Teaching Facilities at the Yale University School of Medicine, January 1949.

A tumor conference is held weekly—open to students—and reviews diagnostic and therapeutic problems. Staff members of the radiology, surgery, or surgical pathology departments analyze each case. The conferees discuss each case, explaining how and why certain diagnosis and therapy recommendations are made.

Detection Centers

Possibly, the most recent major device in cancer instruction is the detection center. Standards for this type of clinic were first formulated by the American College of Surgeons in 1946. At such a center, the medical student participates in examining persons not known to have cancer. Here he may learn vital lessons about how to discover cancer.

Among medical schools that use detection clinics are the Universities of Illinois and Minnesota. The experience of these schools attests that detection centers increase the student's regard for thorough examinations, help him better to understand why cancer should be sought even when no obvious symptom of the disease is apparent, and increase his knowledge of modern discovery methods. In terms of actual medical practice, this means better physical examinations and an increased awareness on the part of the student to the fact that unless cancer is looked for specifically, it frequently goes undiscovered for a period of time.

Third and fourth year curricula seem best able to incorporate this training. Much the same teaching procedure is used as in the tumor clinics.

Other Teaching Aids

Additional methods of improving cancer education include periodic cancer conferences and seminars, visual aids and cancer libraries. At least 27 schools offer postgraduate training, and about 40 schools maintain some type of statistics on observed cancer cases. In this group are follow-up services, tumor registries and statistical studies covering incidence and prevalence rates, types and sites of cancer, etc.

Cancer research conducted in more than 25 schools encourages student participation and stimulates interest in cancer research careers.

Basic Sciences

Long before he is qualified to study cancer as a complete subject, the student should be impressed with the significance of the disease and the foundation should be prepared for intensified training in the field in his later years at medical school. During the pre-clinical instruction given in the basic sciences—anatomy, physiology, biochemistry, pathology, etc.—most schools attempt to emphasize their relationship to cancer. The student is particularly well instructed in histopathology and biological growth and development processes, since cancer is essentially a growth without organization or any adult processes common to normal growth. In some schools, as a new departure in teaching, second-year students are given an opportunity to apply their academic work in pathology to clinical material through correlation conferences. To add to the student's interest in the disease, lecture material on cancer biology often includes references to current research projects.

Evaluation and Review

Many schools recognize the importance of planning the growth of cancer instruction. Most of them began their expanded teaching programs only after careful planning and many discussions between department heads and clinicians to determine how the school's services and facilities could best be mobilized to meet the problem. In some cases, the schools have adopted fairly elaborate methods for checking on the soundness and effectiveness of the teaching that has since developed. The University of California, for example, has a program of review using the following devices:

1. Tests to determine how much a student retains of cancer instruction he took a year earlier.
2. Tests to determine how well a student's knowledge of cancer applies to the situations he is likely to meet in practice: to find out if he is learning too much about rare and not enough about common problems.
3. Regular faculty critiques of instruction on the basis of written versions of the lectures being presented, of voice recordings of class instruction, or of actual attendance at clinics and classes.
4. Faculty conferences for exchange of advice and suggestions about new problems, attendant to development of the instruction program.
5. Preparation of an annual summary of cancer teaching techniques, to serve as a stock-taking device and as a basis for plans for the next year.

The National Cancer Institute recognizes that Federal grants, averaging less than $25,000 a year for each of the participating medical schools, are a relatively small supplement to the considerable resources of time, money, and skill that the schools themselves are beginning to apply—and in some cases have long applied—to cancer instruction. Federal funds are intended to be a stimulant to the teaching of cancer, and not to be the sole or even major support for that teaching.

During its first year and a half, Federal assistance plainly has added to the resources of the medical schools; but more important than that, it may have given school administrators occasion to think hard and profitably about the most efficient use of their own facilities for cancer instruction.

The goals of that instruction are to improve the physician's ability to discover and treat cancer and to reduce the dreadful mortality from that disease. Since the Federal program has not yet been in effect for even one 4-year "generation" of medical school students, it is too early to measure the progress made toward those goals. It is not too early to say, however, that the advances made to date on this new frontier of medical education seem to hold great promise for the future.

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Cancer Teaching in Dental Schools

By RAYMOND F. KAISER, M. D.*

After the National Cancer Institute initiated in 1946 its program for improved cancer teaching in medical schools, a similar system of teaching grants was extended to dental schools. This program, started at the end of 1947 with the approval of the National Advisory Cancer Council, has met with enthusiastic response among members of the dental profession. Thirty-six of the Nation's 40 dental schools have taken advantage of the dental teaching grants to give their students a better grounding in cancer pathology, recognition of early lesions, and principles of cancer diagnosis and treatment. Most of the grants have been for the maximum amount allowable, $5,000.

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Twelve percent of all cancer arises in the oral cavity or on the skin of the head and neck. The dentist, whose patients come for examination and treatment at regular intervals, has an excellent opportunity to observe such lesions in their early stages and make certain that the patient obtains prompt diagnosis and treatment The dentist's ability as a case finder, however, will depend on whether he is constantly on the watch for signs of malignancy and whether he has been trained to recognize possible cancerous lesions.

Good oral hygiene is considered an important factor in the prevention of oral cancer. Irritation by malformed or broken teeth, chronic ulceration or infection, leukoplakia, and other unhealthy conditions may predispose the mouth tissues toward malignancy. Correction of such conditions is an important service that the dentist can give his patient.

The importance of the dentist in cancer detection is recognized in the plan for dental teaching grants A letter sent to deans of all dental schools, January 7, 1948, outlines the plan as follows:

"The National Advisory Cancer Council has recommended to the Surgeon General of the Public Health Service that block grants of from $2,000 to $5,000 be made annually to dental schools for the purpose of improving the teaching of cancer. A grant-in-aid for a similar purpose has been offered to medical schools

"The Council has specifically recommended:

"(1) that the dean and faculty of each dental school be asked to review the present method of teaching cancer in their school.

"(2) that, if an integrated course in cancer is not already given, the school consider a program of instruction preferably in the senior year in which the pathology, physiology, and biochemistry of cancer are correlated with a weekly clinic devoted to the presentation of cancer and that, whenever possible, advantage be taken of integrating the cancer teaching program of the dental school with that of the medical school.

"(3) that they undertake to stimulate cancer research in their school since it is recognized that research improves teaching and stimulates student interest.

"It is recognized that the most effective method for improving cancer teaching will vary from school to school, and there is no desire on the part of the National Advisory Cancer Council to suggest a uniform plan. Hence it is suggested that it would be most desirable for you and your faculty to review how best to improve your teaching of cancer and how best to stimulate interest (research and training) in cancer in your dental school. You may then submit to us, for consideration by the National Advisory Cancer Council, a program showing the additional expense involved for which assistance is needed.

"The Council considers that this program will provide an important contribution toward the control of cancer. The Council on Dental Education of the American Dental Association, whose members have been consulted and have approved the program, has also agreed that this program is important. To render the program most effective the National Advisory Cancer Council and National Cancer Institute will attempt to provide maximum assurance of continuity. Accordingly, it will be our policy initially to approve grants for the first 2 years' operation of the program and to provide funds now for the first year. Funds for the second year will be set aside so that you may be assured of their availability. Applications for continuation for a third year will be considered early in the second year. A similar policy will be followed in the years beyond the third year."

In 1947, when the program was proposed, courses in oral diagnosis were possibly one of the weakest aspects of dental training. Cancer received inadequate attention in most schools, and the young graduate went out to practice dentistry equipped with relatively little information about the nature of the disease or how to recognize it in his patients.

Judging from the budgets proposed by the schools, dental educators believed that this situation could best be corrected by (1) enlargment of the teaching staff for cancer instruction, and (2) additional and improved visual teaching aids. The major part of the requested funds was to be used for salaries of teaching staffs and visiting lecturers, and the remainder for preparation and use of slides, photographs, gross specimens, movies, and other visual aids. The need for visual aids was so urgent at one school that the entire grant was devoted to preparation of slides.

More than half of the dental schools proposed to establish a program of lectures on cancer as the backbone of their cancer training program. Tufts College Dental School, for example, outlined the following four basic lectures by members of the staff:

1. Classification and histopathology of tumors.
2. Etiology and pathogenesis: extrinsic factors that can be controlled by the dentist (preventive measures).
3. Early diagnosis, including the value and technique of biopsy, and recognition of metastases to regional lymph nodes.
4. General principles of treatment: the implications of surgical and X-ray therapy.

Three programs to be given by guest lecturers would emphasize clinical cancer problems. These lectures were to be supplemented by laboratory sessions, clinical observation, and student participation in the microscopic diagnostic service.

Nine schools proposed to introduce or expand regular oral cancer courses for third or fourth year students. The required course in oral cancer proposed by the Temple University School of Dentistry included:

1. The general cancer problem: background and development (2 hours).
2. Pathology (12 hours).
3. Early diagnosis—its importance (5 hours plus clinic).
4. Causative factors, and pre-cancerous lesions and conditions (3 hours plus clinic).
5. The biopsy (4 hours plus clinic).
6. Teeth as complicating factors in oral malignancy. Osteonecrosis. (The management of teeth in patients with oral malignancy before, during, and after treatment.) (4 hours).
7. Principles of therapy (4 hours).
8. General care of the patient, including nutrition, control of infections, chemotherapy, mental hygiene, etc. (3 hours).
9. Follow-up period—its importance (2 hours).
10. Role of the dentist in a tumor clinic (3 hours).
11. The ideal cancer control program for oral malignancy—a review (3 hours).

Clinical cancer experience is an important element in most proposed cancer programs. In some cases, this experience is given in the dental clinic where, except in very large clinics, opportunities to observe malignancies is limited. Thirteen schools report that students observe and work in a tumor clinic, usually one connected with a university medical school. Eight schools have, or intend to establish, oral cancer clinics. New York University College of Dentistry plans to use grant funds to set up a cancer teaching clinic which would use selected material from the 20,000 patients coming annually to the university dental clinic.

Most of the schools emphasize four subjects: the nature and causes of cancer, prevention, recognition of early cancer, and principles of diagnosis and therapy. Some schools go more deeply into certain aspects. In Michigan, for example, where State laws permit cancer treatment by oral surgeons, more emphasis may be placed upon therapy. In some schools, the actual technique of biopsy is taught, as well as the value and principles of this diagnostic method. At the University of Texas, the proposed program includes instruction in reconstruction and prosthesis following surgical treatment of cancer, using clinical material from the M. D. Anderson Memorial Hospital.

For what seems to be a well-rounded proposal, we cite the program submitted by the University of Louisville School of Dentistry:

1. Regularly scheduled lectures on cancer prevention, diagnosis and treatment.

2. Regularly scheduled cancer clinics for senior students.

3. Demonstrations of pre-cancerous and cancerous lesions in course of routine work at the dental school general clinic.

4. Seminar and discussion groups for seniors on case reports and histories, cancer research, and general cancer problems.

5. Expansion of regularly scheduled lectures for juniors and seniors to place more emphasis on cancer problems.

6. Improvement in correlation between basic science and clinical courses.

7. Expansion of laboratory courses to allow more study of cancer pathology and pre-cancerous lesions.

8. Improvement in laboratory and photographic facilities for better preparation and use of visual teaching aids.

9. Main emphasis: causes, prevention, and early diagnosis of cancer.

Year-end progress reports are received from dental schools when they apply for renewal grants. These reports indicate continued enthusiasm for the program and a high degree of success in working out the proposed teaching projects.

Emphasis seems to be well placed, chiefly on early recognition of cancer and correction of pre-cancerous conditions. Through expansion of clinical cancer experience, particularly in the senior year, students are apparently receiving wider first-hand cancer experience. By developing their collections of slides and other visual aids, the dental schools are able to provide better illustrative materials for lectures and for laboratory study. In many cases these visual aids are also being used in information work for practicing dentists.

These dental teaching grants are obviously inadequate to permit the expansion in cancer teaching that is actually needed. It is clear from the submitted budgets that most of the schools are contributing just as much, or more, to the expansion of cancer teaching from their regular funds. Even with these contributions from both sources, most dental schools are able to make only a good beginning toward a well-rounded cancer program. It is hoped that these efforts will encourage other sources, possibly voluntary societies or educational foundations, to contribute additional funds for cancer teaching in dental schools.

The enthusiastic response of the dental educators and the evident progress that has been made with limited funds prove that the National Advisory Cancer Council was correct in judging the need for such a program. It may be true that the dentist is effective as a case finder only for a limited proportion of cancers, but it is these types, the malignancies of skin and mouth, that are often most susceptible to treatment. Here, early case-finding efforts show the most fruitful results.

New Tools for Professional Cancer Education

Cancer Reports Section, National Cancer Institute

Professional education is perhaps the crux of any cancer program. It tries first of all to raise the "index of suspicion" among members of the medical and allied professions for signs of cancer. If more cases are found earlier, diagnosed earlier, and treated earlier, cancer mortality rates can be materially reduced. Lay education has made many people aware of early cancer symptoms and brings many into the doctor's office while the possibility of successful treatment is still favorable. The real responsibility for early case finding, however, rests with the first physician, dentist, or nurse who sees the patient and has an opportunity to observe signs of disease.

An information program can also help the medical, and allied professions keep up to date on developments in cancer diagnosis and treatment. It can promote use of the cytologic test as a case finding and diagnostic aid, and the wider use of biopsy as a tool for accurate diagnosis. It can make sure that physicians, dentists, and nurses know about the facilities and services for cancer care available in their own communities. It can help instruct nurses in home and bedside care for the patient.

The National Cancer Institute provides aid both directly and indirectly for professional education. Cancer control grants-in-aid to State health departments are used in part for information work and professional training.

Traineeships are provided to a limited number of qualified physicians for specialized training in the various professional categories dealing with clinical cancer. Grants to medical and dental schools are used to improve cancer teaching for undergraduates. The Yale and Harvard Schools of Public Health now offer regular courses in cancer control with the aid of special Institute grants.

Professional education projects need not only funds, but also teaching materials. One good film may do more to drive home the importance of early diagnosis than a whole series of lectures. Slides can show the dentist exactly what type of oral lesions may be signs of serious trouble. A comprehensive handbook of cancer nursing may substitute for many hours of lecturing and provide a convenient reference source for the busy visiting nurse.

Films

A new approach to medical films is made in a series of six films being produced by the National Cancer Institute jointly with the American Cancer Society. Presenting the thesis that early diagnosis can reduce cancer mortality, these films are designed for showing before groups of practicing physicians, medical students, and the allied professions. "Cancer: The Problem of Early Diagnosis," the first of the series, is already being distributed. It is general in scope, while each of the succeeding five films will deal with cancer diagnosis of a specific site—oral, breast, uterine, lung, and gastro-intestinal cancer. They will run from 20 to 40 minutes. The first film, which runs 30 minutes, may be shown alone, or may serve later as an introduction to the entire series.

"Cancer: The Problem of Early Diagnosis" opens with a dramatic and historically accurate scene showing the first successful operation for gastric cancer as performed in 1881 by Dr. Theodor Billroth at the Vienna General Hospital. At that time, the diagnosis of cancer was usually a death sentence. In his pioneering operation, Dr. Billroth gave proof that even gastric cancer could be operable. Thus opened a new era in cancer treatment.

From this introduction, the film considers the cure of early cancer through use of modern techniques of surgical and radiation therapy. Taking cancer of the breast, stomach, rectum, cervix, and lung, the film indicates clues to early diagnosis and shows the probability of survival when the patient receives prompt treatment, as contrasted with experience in cases found and treated late. Using color photography of examination procedures and close-up views of surgical operations, combined with animated medical drawings and diagrams, the film presents an effective argument for constant vigilance on the part of the practitioner.

Since the first showing in December 1948, "Cancer: The Problem of Early Diagnosis" has received endorsement from medical, scientific, and educational authorities. Using techniques developed by modern documentary film makers, it makes its point forcefully through a combination of well-directed photography, careful cutting, skillful blending of sight and sound, and technical accuracy.

The film may be presented by itself, or may supplement a lecture or discussion program. A 16-page pamphlet, distributed with each print, suggests how to make the most of this teaching aid. A 4-page leaflet is also available for promoting the use of this film among local professional groups.

In an effort to test reaction to the first film of the series, a penny post card questionnaire was printed and has been enclosed with "prints" of the film sent out to professional groups. Returns—from hospitals, medical schools, and county and local medical societies—virtually unanimously endorsed the teaching and content value of the film.

The next film of this series, on breast cancer, will be released in the fall.

Specifications and directions for obtaining the first film follow:

CANCER: THE PROBLEM OF EARLY DIAGNOSIS

Audience: Hospital staffs, medical societies, medical schools, and other gatherings of physicians.
Specifications: 16 millimeter sound film in color.
Running time: 30 minutes.

Borrow from

Association Films regional depots:
347 Madison Avenue, New York 17, N. Y.
206 South Michigan Avenue, Chicago 3, Ill.
3012 Maple Avenue, Dallas 4, Tex.
351 Turk Street, San Francisco 2, Calif.
State Health Departments
State Cancer Societies

(The film may be borrowed from these sources without cost except for shipping charges and possibly a small service charge.)

Buy from

Audio Productions, Inc., 630 Ninth Avenue, New York 19, N. Y.
Cost: $150. (Audio will send a print for preview without charge).

The National Cancer Institute is also interested in aiding in the distribution of films made by other groups which can contribute to cancer control. Copies of such films will be purchased and placed in regional Federal Security Agency offices where they will be available on loan.

"Pre-Cancer Diagnosis of the Cervix by Cytology" is available for professional audiences This film was produced by Dr. J. Ernest Ayre of McGill University in Montreal to demonstrate the advantages and limitations of the cytologic technique in case finding and diagnosis. Dr. Ayre, a leading exponent of the cytologic test, has designed this film to illustrate for practitioners and for third- and fourth-year medical students how indications of cancer in situ may be found before the patient is aware of any symptoms.

The film shows the method of obtaining cervical smears and scrapings; color microphotographs of the various types of cells found in normal, cancerous, and pre-cancerous conditions; and comparison of the clinical picture of cervical cancer with the cytologic picture.

PRE-CANCER DIAGNOSIS OF THE CERVIX BY CYTOLOGY

Audience: Hospital staffs, medical societies, medical schools, and other gatherings of physicians.

Specifications: 16 millimeter sound film in color.

Running time: 30 minutes.

Borrow from

Medical Director, Federal Security Regional Offices:
Region 2—42 Broadway, New York 4, N. Y.
Region 6—1539 Jackson Avenue, New Orleans 15, La.
Region 7—Room 2200 Fidelity Building, Kansas City 6, Mo.
Region 10—Room 441 Federal Office Building, San Francisco 2, Calif
National Cancer Institute, Public Health Service, Bethesda 14, Md.
Public Health Service Medical Center, Hot Springs, Ark.

(The film may be borrowed from these sources without cost except for shipping charges.)

Buy from

Cytology Institute, 135 East Sixty-fifth Street, New York, N. Y.
Cost: $175.

Slides

The lantern slide provides illustrative material for the lecturer or instructor, thus serving a different purpose than the film, which usually tells a complete story by itself. Individual slides may be studied as long or as often as necessary, and the material may be arranged to suit the specific needs of the audience.

Recognition of cancerous and pre-cancerous conditions is one of the most important aspects of professional education. The average physician sees only three or four cancer cases annually and has no opportunity in ordinary practice to study more than a few different types of cancer.

A series of 108 medical cancer slides is now available from the National Cancer Institute to demonstrate the appearance of various types of cancer lesions. These slides show gross lesions and X-ray photographs of diagnosed cancers of the most important sites. Most of the slides were prepared under the direction of Drs. John E. Wirth and Ralph S. Lloyd at the United States Marine Hospital in Baltimore, Md.

Accompanying each set of slides is a booklet giving for each slide the chief complaint mentioned by the patient, a brief case history, and physical findings.

MEDICAL CANCER SLIDE SERIES

Audience: Physicians and medical students.

Specifications: Set of 108 slides, some in color, measuring 2 by 2 inches.

Borrow from

Medical Director, Federal Security Regional Offices.

This slide series is not yet available for purchase.

Twenty-two of these medical slides show lesions of the oral cavity and skin of head and neck and are available separately for use by dental groups. Dentists, who are showing increased interest in cancer control, can learn to recognize lesions which may be cancer and recommend that the patient seek prompt diagnosis and treatment. Dentistry is a promising field for cancer prevention efforts. By correction of chronic infections and irritated conditions, the dentist may prevent so-called pre-cancerous conditions from developing into cancer lesions. These 22 slides show selected types of benign and malignant lesions for study by dental society, clinic, or undergraduate group. A booklet accompanies each set giving the chief complaint of the patient, a brief case history, and physical findings for each lesion shown.

ORAL CANCER SLIDE SERIES

Audience· Dentists and dental students.
Specifications Set of 22 color slides measuring 2 by 2 inches.

Borrow from

Medical or Dental Director, Federal Security Regional Offices.

Buy through

Dr. R. S. Lloyd, United States Marine Hospital, Baltimore, Md.
Cost: $4.40 per set. Make checks payable to Eastman Kodak Co

Cancer patients often have special nursing needs. By learning how to care for the post-operative patient and how to help the patient care for himself, the nurse can contribute greatly to his comfort and successful convalescence. This instruction is particularly important for the public health nurse or visiting nurse who is called upon to give home care.

A series of 100 slides has been assembled by the National Cancer Institute for use in nurse instruction. Most of these slides are devoted to care of the post-operative cancer patient. They show many special procedures including nasal and gastrostomy feeding; dressings and care of tracheostomy, laryngectomy, mastectomy, colectomy, cystostomy, limb amputations and other surgical operations; giving transfusions in the home; and handling radium and radon seeds. Also included are slides showing how to teach the correct procedure for self examination of the breast. Statistical charts show cancer incidence and survival rates. These slides were prepared by the United States Marine Hospital in Baltimore, and in cooperation with Montefiore Hospital in New York City and the New York Visiting Nurse Service, and by the staff of the National Cancer Institute. A booklet describing each slide accompanies the series.

CANCER NURSING SLIDES

Audience: Graduate and student nurses.

Specifications: Set of 100 black-and-white slides in two sizes. (See below.)

Borrow from

Medical Director, Federal Security Regional Offices.

Size: 3¼ by 4 inches and 2 by 2 inches.

Buy from

Creative Arts Studio, 1223 Connecticut Avenue, Washington, D. C.

Size: 2 by 2 inches.

Cost: $35 per set.

Manuals

Although cancer is now regarded as a public health problem, this is a comparatively recent development. Relatively few public health workers have had training or experience in cancer control. The National Cancer Institute is attempting to meet this need in several ways: by financial aid for cancer control courses at schools of public health; by consultant services for health agencies; by loan of personnel for teaching purposes; and by providing manuals on control methods.

The manual, "Cancer Nursing" is being prepared by the National Cancer Institute, jointly with the New York State Department of Health, to instruct the public health nurse in bedside and home care of the cancer patient. A chapter on food and diet will help the nurse teach the family how to prepare meals that will give the patient optimum nutrition. Emphasis is placed on instructing the family in home care methods and on rehabilitating the convalescent patient through use of prostheses, mental hygiene aid, and vocational readjustment whenever possible. A comprehensive chart of cancer symptoms is included to help the nurse recognize conditions demanding medical attention when she observes these in the course of her clinic work or home visits.

As soon as this manual is published it will be available from the National Cancer Institute for distribution throughout the country.

A cancer manual for public health officers is also being prepared jointly with the New York State Department of Health and will be ready for distribution by the end of the year. It is intended as a compact guide to the health administrator in setting up a community cancer control program. The manual will outline basic programs including lay and professional education, cancer reporting and records, cancer prevention, case-finding methods, and cancer care services. Practical suggestions will be included on how to establish a well-rounded program, how the various groups and agencies in the community can participate, lists of source materials, and available education aids.

Pharmacy Program

If the neighborhood pharmacist is on the alert and has learned to suspect possible cancer signs, he can often refer to the doctor's office customers who come to him for a symptomatic remedy. The American Pharmaceutical Association has joined with the National Cancer Institute in a program of cancer education for pharmacists and pharmacy patrons, described in an earlier issue of this journal (August 27, 1948). Essentially, it is preparation of articles on common cancer symptoms for pharmacy journals, and mailing to pharmacists a series of sheets giving brief descriptions of early cancer signs of various sites to be posted in the prescription room. Supplementing the education program for pharmacists is a series of counter cards calling the customer's attention to early cancer signs.

Articles and Pamphlets

The staff of the National Cancer Institute has prepared numerous pamphlets and articles on aspects of cancer control. Copies of these are available from the Cancer Reports Section for use in developing professional information programs and other types of control activities. They cover such subjects as the work of the Institute; the role of the dentist, nurse, or pharmacist in cancer control; and cytologic test methods. Studies of environmental cancer, cancer epidemiology, special control projects, and other subjects may be of interest to State and local health workers, and others. A list of some of these materials is given below.

ARTICLES AND PAMPHLETS ON CANCER CONTROL

Copies are available from Cancer Reports Section, National Cancer Institute, Bethesda 14, Md.

The U. S. Fights Cancer. The Cancer Program of the National Cancer Institute, 19 pages, 1948.

Program of the National Cancer Institute. *Public Health Reports* **63:** 501–517, April 16, 1948. Reprints available.

Austin V. Deibert, M. D. Recent Developments in Cancer Control. *Journal of the American Public Health Association* **38:** 191–201, February 1948.

Services and Facilities for Cancer Control in the United States, January 1948. *Public Health Reports*, Supplement No. 208, 87 pages, June 1948.

Marion Ferguson, R. N. The Public Health Nurse and the Cancer Program, *Public Health Nursing* **40:** 343, July 1948. Reprints available.

Elizabeth Walker, R. N. Cytologic Test for Cancer. *American Journal of Nursing* **49:** 43–45, January 1949.

Ralph S. Lloyd, M. D. Role of the Dentist in Oral Cancer Detection. *Public Health Reports* **63:** 805–812, June 18, 1948.

Raymond F. Kaiser, M. D. The Pharmacist's Place in Cancer Control. *Public Health Reports* **63:** 1111–1113, August 27, 1948.

W. C. Hueper, M. D. Environmental Cancer, 19 pages, 1948.

W. C. Hueper, M. D. Environmental and Occupational Cancer. *Public Health Reports*, Supplement No. 209, 69 pages, 1948.

Allen N. Koplin, M. D. Objectives and Program of the Arkansas Cancer Detection Project. *Public Health Reports* 63: 813–821, June 18, 1948. Reprints available.

In addition to these professional cancer information materials, a series of six pamphlets, each one on cancer of a special site—breast, genito-urinary, respiratory, female generative organs, intestinal, and oral cancer—have been written especially for the public. They are being published jointly by the National Cancer Institute and the American Cancer Society and will soon be available from both organizations.

An increasing number of excellent films, bulletins, and manuals are being issued by various professional societies, State and local health agencies, and voluntary organizations, notably the American Cancer Society and its affiliated State groups. Medical and dental schools, with the aid of National Cancer Institute teaching grants, are constantly improving their teaching materials, particularly their study collections of microscopic slides and other visual aids. The National Cancer Institute, able to draw on resources from all over the country, attempts to supplement these efforts by furnishing at minimal cost materials which local or State groups might not be able to prepare themselves.

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED MAY 28, 1949

A total of 155 cases of poliomyelitis was reported, as compared with 101 last week, 138 for the corresponding week last year, and a 5-year (1944–48) median of 44. Increases of more than 3 cases were reported in only 5 States, as follows: Texas, from 42 cases last week to 72, California 11 to 18, Arkansas 2 to 9, Florida and Oklahoma, each, 3 to 7. No other State reported more than 4 cases except Louisiana (5). A total of 696 cases has been reported since March 19, the average date of lowest weekly seasonal incidence, as compared with 729 for the corresponding period in 1948 and a 5-year median of 343 reported in 1945.

The incidence of measles declined from a total of 23,635 cases last week to 19,834 currently. The total for the corresponding week last year was 26,409, and the corresponding 5-year median 17,935.

Of 20 cases of Rocky Mountain spotted fever reported (last week 26, 5-year median 13), 6 occurred in the Middle Atlantic area, 6 in the South Atlantic, 5 in the Central States, and 3 in the Mountain area. Only New Jersey (with 4 cases), and Maryland (3 cases), reported more than 2 cases each for the week. The total to date is 103. The largest corresponding figure of the past 5 years was 65 cases.

Of current figures for the other 9 diseases listed in the following tables, only that for diphtheria (102 cases, last week 96, 5-year median 189) is above last week's figure, and only that for infectious encephalitis (13, last week 19), is above the 5-year median (9).

One case of anthrax was reported currently, in New York, and 4 cases of smallpox were reported, 2 in Michigan, and 1 case each in Kansas and Oklahoma.

Deaths recorded during the week in 94 large cities in the United States totaled 9,008 as compared with 8,871 last week, 9,013 and 8,163, respectively, for the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 8,324. The total for the year to date is 202,313 as compared with 206,415 for the corresponding period last year. Infant deaths for the week totaled 661, last week 592, 3-year median 675. The cumulative figure is 13,731, as compared with 14,437 for the corresponding period last year.

Telegraphic case reports from State health officers for week ended May 28, 1949

[Leaders indicate that no cases were reported]

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mountain spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever ᵉ	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine	--------	--------	--------	161	--------	2	--------	--------	5	--------	--------	--------	9	--------
New Hampshire	--------	--------	1	15	--------	--------	--------	--------	3	--------	--------	--------	1	--------
Vermont	--------	--------	--------	98	1	--------	--------	--------	1	--------	--------	--------	5	--------
Massachusetts	14	--------	--------	408	1	--------	2	--------	142	--------	--------	3	111	--------
Rhode Island	--------	--------	--------	42	--------	6	--------	--------	6	--------	--------	--------	2	--------
Connecticut	--------	--------	1	839	--------	29	--------	--------	30	--------	--------	--------	12	--------
MIDDLE ATLANTIC														
New York	9	1	(ᵉ)	1,999	3	183	4	1	ᵈ 119	--------	--------	1	119	5
New Jersey	--------	--------	1	1,594	2	40	--------	4	67	--------	--------	1	81	1
Pennsylvania	6	--------	(ᵉ)	1,615	4	--------	2	1	123	--------	1	2	77	8
EAST NORTH CENTRAL														
Ohio	11	--------	--------	1,738	5	67	--------	1	161	--------	--------	4	51	13
Indiana	2	--------	--------	44	--------	--------	1	1	61	--------	--------	1	2	20
Illinois	--------	2	--------	209	4	42	4	--------	58	--------	1	1	68	11
Michigan ᵉ	2	2	1	835	--------	44	1	--------	255	2	--------	--------	40	2
Wisconsin	--------	--------	1	1,983	2	3	--------	--------	30	--------	--------	--------	44	--------
WEST NORTH CENTRAL														
Minnesota	--------	--------	--------	82	1	4	--------	--------	16	--------	--------	1	1	--------
Iowa	--------	--------	--------	114	1	1	--------	--------	10	--------	--------	--------	1	4
Missouri	--------	--------	1	147	2	19	--------	--------	16	--------	--------	--------	5	--------
North Dakota	--------	--------	5	53	1	--------	--------	--------	3	--------	--------	--------	--------	--------
South Dakota	--------	--------	--------	58	--------	--------	1	1	--------	--------	--------	--------	--------	--------
Nebraska	--------	--------	--------	113	--------	--------	--------	--------	3	--------	--------	--------	--------	--------
Kansas	--------	--------	--------	289	--------	13	--------	--------	7	1	--------	--------	8	--------
SOUTH ATLANTIC														
Delaware	--------	--------	--------	25	--------	--------	1	--------	5	--------	--------	--------	--------	--------
Maryland ᵉ	3	--------	1	135	--------	42	--------	3	ᵈ 33	--------	--------	--------	19	--------
District of Columbia	1	--------	--------	40	--------	10	--------	--------	1	--------	--------	--------	--------	--------
Virginia	--------	--------	65	608	1	30	--------	--------	7	--------	--------	1	14	--------
West Virginia	1	--------	4	147	1	1	--------	--------	5	--------	--------	1	17	--------

North Carolina	9	1	----------	742	2	----------	2	1	9	----------	----------	1	36	----------
South Carolina	1	1	187	414	----------	91	----------	----------	7	----------	----------	1	18	6
Georgia	----------	----------	7	308	----------	20	2	2	7	----------	----------	4	12	8
Florida	2	1	2	136	1	12	7	----------	4	----------	----------	3	3	1
EAST SOUTH CENTRAL														
Kentucky	3	----------	----------	188	1	20	3	----------	8	(1)	----------	3	16	11
Tennessee	1	1	6	420	1	39	----------	----------	7	----------	----------	1	29	----------
Alabama	3	----------	7	211	7	28	2	----------	6	----------	1	2	44	11
Mississippi [e]	1	1	11	66	1	26	2	----------	2	----------	----------	----------	5	----------
WEST SOUTH CENTRAL														
Arkansas	----------	----------	16	255	2	23	9	1	----------	----------	13	1	10	3
Louisiana	----------	----------	2	18	1	45	5	1	----------	----------	----------	1	1	----------
Oklahoma	----------	----------	----------	206	----------	12	7	----------	2	1	----------	----------	5	4
Texas	17	3	499	921	9	204	72	----------	16	----------	1	7	141	15
MOUNTAIN														
Montana	----------	----------	3	362	1	8	----------	1	2	----------	----------	----------	2	----------
Idaho	----------	----------	6	197	----------	----------	1	----------	[d] 14	----------	----------	----------	2	----------
Wyoming	2	----------	1	19	----------	1	----------	2	2	----------	----------	----------	----------	----------
Colorado	----------	----------	8	130	----------	8	1	----------	3	----------	----------	----------	----------	----------
New Mexico	1	----------	----------	50	----------	13	----------	----------	4	----------	----------	----------	2	----------
Arizona	3	----------	29	84	----------	7	1	----------	10	----------	----------	----------	15	----------
Utah [e]	----------	----------	----------	138	----------	3	3	----------	5	----------	3	----------	19	----------
Nevada	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------
PACIFIC														
Washington	3	----------	----------	490	2	4	1	----------	16	----------	----------	----------	12	----------
Oregon	2	----------	1	194	----------	22	3	----------	8	----------	----------	----------	24	----------
California	5	----------	5	996	1	19	18	----------	[d] 59	(1)	----------	4	58	5
Total	102	13	871	19,834	58	1,141	155	20	1,358	4	20	44	1,139	----------
Median, 1944-48	189	9	884	17,985	121	----------	44	13	2,802	7	20	88	1,914	----------
Year to date, 21 weeks	3,214	200	70,721	501,384	1,726	44,883	1,619	103	52,357	[1] 45	498	943	21,430	----------
Median, 1944-48	5,392	177	185,224	419,563	3,500	----------	888	63	72,816	211	376	1,094	43,471	----------
Seasonal low week ends	(27th) July 10	----------	(30th) July 31	(35th) Sept. 4	(37th) Sept. 18	----------	(11th) Mar. 19	----------	(32nd) Aug. 14	(35th) Sept. 4	----------	(11th) Mar. 19	(39th) Oct. 2	----------
Since seasonal low week	8,328	----------	196,991	553,727	2,570	----------	696	----------	75,055	[1] 60	----------	483	31,463	----------
Median, 1943-48 [b]	12,958	----------	328,818	454,599	5,004	----------	343	----------	111,387	292	----------	618	74,439	----------

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[a] Period ended earlier than Saturday.

[b] The median of the 5 preceding corresponding periods; for poliomyelitis and typhoid fever the corresponding periods are 1944-45 to 1948-49, inclusive.

[c] New York City and Philadelphia only, respectively.

[d] Including cases reported as streptococcal infection and septic sore throat.

[e] Including paratyphoid fever; reported separately, as follows: New Jersey 1, Louisiana 1, Texas 2, California 2. One case of salmonella infection (not included) was reported in Maryland.

[1] The case of smallpox reported in California for the week ended May 7, 1949, was an imported case, occurring in a seaman, who acquired the infection in the Orient and arrived at San Diego on May 4. One case reported as smallpox in Kentucky for the week ended Apr. 30, was later reported not to be smallpox. Both cases have been deducted from cumulative totals.

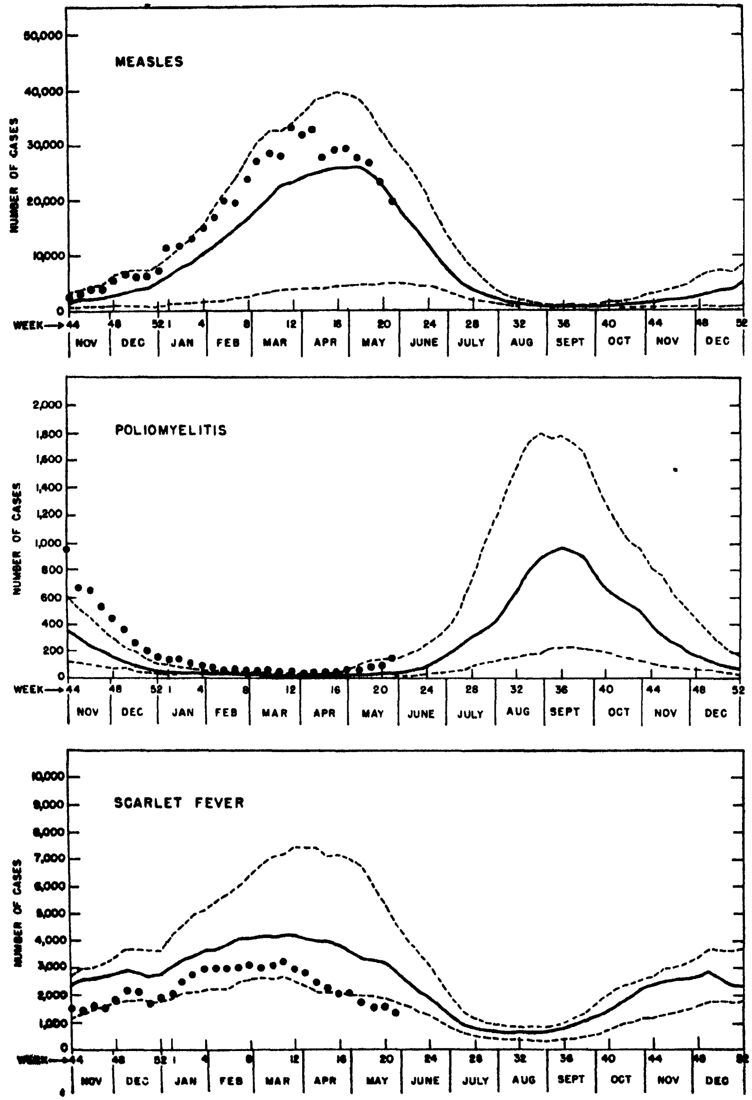
Anthrax: New York 1.

Alaska: No cases reported.

Hawaii Territory: Diphtheria 1; measles 62; whooping cough 1.

Communicable Disease Charts

All reporting States, November 1948 through May 28, 1949



The upper and lower broken lines represent the highest and lowest figures recorded for the corresponding weeks in the 7 preceding years. The solid line is a median figure for the 7 preceding years. All three lines have been smoothed by a 3-week moving average. The dots represent numbers of cases reported for the weeks of 1949.

PLAGUE INFECTION IN COLORADO AND NEW MEXICO

Under date of May 23, 1949, plague infection was reported proved in pools of fleas from rodents collected in Park County, Colo., and Colfax and McKinley Counties, N. Mex., as follows:

COLORADO

Park County.—A pool of 43 fleas from 2 prairie dogs, *Cynomys gunnisoni*, shot 13 miles southeast of Hartsel on May 6.

NEW MEXICO

Colfax County.—Collected on May 3, a pool of 83 fleas from 8 prairie dogs, *Cynomys gunnisoni*, and 8 burrows in an area extending 5 miles south from Eagle Nest along United States Highway No. 64, and a pool of 23 fleas from 10 burrows of prairie dogs (same species) taken 7 miles north of Eagle Nest along State Highway 38.

McKinley County.—Collected 20 miles east of Gallup along United States Highway No. 66 on May 3, 4 pools of fleas, as follows: 18 fleas from 10 wood rats, *Neotoma albigula;* 13 fleas from 46 white-footed mice, *Peromyscus truei;* 13 fleas from 60 white-footed mice, *Peromyscus boylii;* 2 fleas from 7 harvest mice, *Reithrodontomys* sp. A pool of 20 fleas from 107 white-footed mice, *Peromyscus maniculatus*, trapped 1 mile west of the Zuni River on May 13.

DEATHS DURING WEEK ENDED MAY 21, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 21, 1949	Corresponding week, 1948
Data for 94 large cities of the United States		
Total deaths	8,871	
Median for 3 prior years	8,894	
Total deaths, first 20 weeks of year	193,305	197,402
Deaths under 1 year of age	592	590
Median for 3 prior years	639	
Deaths under 1 year of age, first 20 weeks of year	13,070	13,762
Data from industrial insurance companies		
Policies in force	70,403,458	71,081,927
Number of death claims	12,276	13,486
Death claims per 1,000 policies in force, annual rate	9.1	9.9
Death claims per 1,000 policies, first 20 weeks of year, annual rate	9.7	10.3

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended May 7, 1949.—During the week ended May 7, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		14	1	216	478	28	45	33	148	963
Diphtheria		3		1	1				2	7
Dysentery, bacillary				3					7	10
Encephalitis, infectious				1	1					2
German measles		6		401	42	2	93	30	15	589
Influenza		62			5	2	1			70
Measles		120	19	177	246	148	207	348	309	1,574
Meningitis, meningococcal									1	1
Mumps		46		131	318	16	10	6	111	638
Poliomyelitis		1				2				3
Scarlet fever		7	2	82	62	2		5	12	172
Tuberculosis (all forms)		3	21	101	50	20	9		59	263
Typhoid and paratyphoid fever			1	6	1			1	1	10
Undulant fever									1	1
Venereal diseases:										
Gonorrhea		2	11	80	73	26	16	31	71	310
Syphilis		4	9	82	37	10	13	2	14	171
Whooping cough		12		97	36	3	1			149

JAPAN

Notifiable diseases—5 weeks ended April 30, 1949, and accumulated totals for the year to date.—For the 5 weeks ended April 30, 1949, and for the year to date, certain notifiable diseases have been reported in Japan as follows:

	5 weeks ended Apr. 30, 1949		Total reported for the year to date	
	Cases	Deaths	Cases	Deaths
Diphtheria	1,588	175	6,545	689
Dysentery, unspecified	310	75	820	215
Encephalitis, Japanese "B"			1	
Gonorrhea	18,119		61,478	
Influenza	580		1,213	
Malaria	206	6	515	14
Measles	28,884		59,953	
Meningitis, epidemic	189	52	569	146
Paratyphoid fever	118	9	546	22
Pneumonia	20,107		66,592	
Scarlet fever	441	5	1,597	24
Smallpox	24	4	39	5
Syphilis	20,173		69,688	
Tuberculosis	46,767		142,099	
Typhoid fever	330	55	1,485	193
Typhus fever	14	1	75	3
Whooping cough	7,649		24,783	

NOTE.—The above figures have been adjusted to include delayed and corrected reports.

CUBA

Habana—Notifiable diseases—5 weeks ended April 30, 1949.—During the 5 weeks ended April 30, 1949, certain notifiable diseases were reported in Habana, Cuba, as follows:

	Cases	Deaths		Cases	Deaths
Chickenpox	68		Smallpox	1	
Diphtheria	20		Tuberculosis	4	1
Malaria	13		Typhoid fever	14	3
Measles	20		Typhus fever (murine)	1	
Scarlet fever	2				

Provinces—Notifiable diseases—5 weeks ended April 30, 1949.—During the 5 weeks ended April 30, 1949, cases of certain notifiable diseases were reported in the Provinces of Cuba as follows:

Disease	Pinar del Rio	Habana[1]	Matanzas	Santa Clara	Camaguey	Oriente	Total
Cancer	2	18	19	15	1	11	66
Chickenpox	5	77	45	6	26	205	364
Diphtheria	2	26	1	1	2	2	34
Leprosy		5		2	1		8
Malaria		4	1	1	2	8	16
Measles	1	30	3	8	5	9	56
Poliomyelitis					1		1
Scarlet fever	1	2	4				7
Smallpox		1					1
Tetanus		1			1		2
Tuberculosis	6	18	22	11	23	20	100
Typhoid fever	9	22	3	9	11	47	101
Typhus fever (murine)		1					1
Undulant fever					1	5	6
Whooping cough		11					11

[1] Includes the city of Habana.

NEW ZEALAND

Gilbert Islands—Butaritari (Makin)—Influenza—Correction.—The item published on page 586 of the Public Health Reports for May 6, 1949, on the epidemic of influenza on the atoll of Butaritari (Makin) in the Gilbert Islands, should have been under the heading "Gilbert and Ellice Islands" (a British Crown Colony) instead of "New Zealand" (a Dominion).

REPORTS OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER RECEIVED DURING THE CURRENT WEEK

Note.—The following reports include only items of unusual incidence or of special interest and the occurrence of these diseases, except yellow fever, in localities which had not recently reported cases. All reports of yellow fever are published currently.

A table showing the accumulated figures for these diseases for the year to date is published in the PUBLIC HEALTH REPORTS for the last Friday in each month.

Smallpox

Great Britain—England and Wales.—During the period May 20–27, 1949, one additional case of smallpox was reported in England, stated to be a contact of the original case that developed on May 7 in a patient residing in a village several miles distant from Liskeard in Cornwall. (See PUBLIC HEALTH REPORTS for June 10, 1949, p. 747.)

India.—During the week ended May 14, 1949, smallpox was reported in certain cities in India as follows: Bombay 70 cases, 18 deaths; Madras 17 cases, 3 deaths; New Delhi 61 cases, 30 deaths.

Nigeria.—Smallpox has been reported in Nigeria as follows: Week ended March 19, 1949, 605 cases, 63 deaths; week ended March 26, 1949, 528 cases, 83 deaths.

Typhus Fever

Egypt.—During the 5 weeks ended April 30, 1949, 87 cases of typhus fever, with 7 deaths, were reported in Egypt. Fifty of these cases were reported from El Dakahliya Province.

Yellow Fever

No reports of yellow fever were received during the current week.

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Public Health Reports

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FEDERAL SECURITY AGENCY

PUBLIC HEALTH SERVICE

FEDERAL SECURITY AGENCY
Oscar R. Ewing, Administrator

PUBLIC HEALTH SERVICE
Leonard A. Scheele, Surgeon General

Division of Public Health Methods
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INCIDENCE OF DISEASE

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Public Health Reports

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Rabies Problems and Control

A Nation-wide Program

By James H. Steele, D.V.M., M.P.H., and Ernest S. Tierkel, V.M.D., M.P.H.*

Few events arouse more terror in a community than the cry of "mad dog." The fear and anxiety which accompanies this disease has hovered over the country since the days of colonization. Records indicate that rabies was present in the colonies as early as 1753, and by 1860 the disease had found its way into most of the States east of the Mississippi River. It then moved westward with the growth of the Nation, and finally invaded California in 1899 (*1*).

In the last 15 years there has been an alarming increase in the incidence of rabies throughout many parts of the country Its effects on health, agricultural economy, and wild-life conservation are disastrous. Each year over 30,000 persons are required to take the long and often painful series of vaccine inoculations as a result of exposure to rabid or suspected dogs. The annual cost to the country for human vaccine treatments and livestock losses exceeds $5 million.

Surveys of present rabies control activities throughout the Nation on State and local levels have indicated a lack of uniformity which has minimized the effectiveness of individual control activities (*2*). Many communities have demonstrated effective rabies control programs; however, neighboring communities may have ineffective programs, or none at all. Epidemics may thus be reintroduced into rabies-free areas. Where one State employs one type of control program, the State to the north of it may employ another which conflicts with the strategy and tactics of its neighbor, while the State to the west may have no planned program at all. The hard fact is that the rabid animal respects no border lines, State or county, but is driven by pathological impulse to roam for miles, causing the spread of an epidemic from one area into another.

The Subcommittee on Rabies, National Research Council in 1945 (*1*) and the National Conference on Rabies in 1947 (*3*) unanimously agreed that nation-wide uniformity of control procedures will be necessary for the eradication of rabies from the United States, and that this can be achieved only if a properly authorized national agency assumes the responsibility of coordinating rabies control activities.

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*From the Veterinary Public Health Division, Communicable Disease Center, Public Health Service.

A proposal has been made to form a Federal rabies control advisory committee composed of members from the Public Health Service, Bureau of Animal Industry, and Fish and Wildlife Service. The principal objective of this inter-departmental policy committee will be to draw a pattern of uniform control methods, based on the latest scientific information, for adoption and action by the States. In the operation of this national policy, the Public Health Service has agreed to (1) distribute to the States information on the latest accepted diagnostic techniques; (2) institute an accurate system of reporting; (3) keep local control authorities posted on the most effective immunization techniques; (4) assist in the drafting of licensing and dog-control ordinances, and (5) prepare and distribute educational material to insure wholehearted cooperation by the general public.

The Public Health Service has embarked on a functional plan for participating in the national program by offering its technical and administrative services to the States for a coordinated attack on the rabies problem.

Serving as the nerve center for rabies control activities is the Rabies Control Branch, Veterinary Public Health Division, Communicable Disease Center. This Branch, with headquarters at Montgomery, Alabama, is active in investigations directed toward all aspects of the control of rabies. These investigations include the improvement and standardization of laboratory diagnostic techniques; training of State and local public health laboratory personnel through organized practical short courses; study of the immunology and pathology of the disease; testing and improvement of new experimental vaccines for animal immunization; preparation and distribution of educational material; epidemiological evaluation of reservoirs of infection; operation of field demonstration control projects; the furnishing of aid in epidemics, and the provision for consultation services in the development of permanent and long-range rabies control programs at the State and local levels.

Laboratory Diagnosis

The attack against any mass disease problem must necessarily begin with adequate diagnostic services. At the Rabies Control Branch laboratory studies are in progress on the comparative evaluation of various diagnostic techniques. The objectives are to determine the most efficient methods of making a diagnosis with the utmost accuracy, speed, economy and practicability. For example, in the microscopic examination of animal brain tissue for Negri bodies, trial surveys have shown that the cumbersome practice of preparing histologic sections is not necessary. A film of brain tissue when properly prepared is just as accurate for purposes of diagnosis and is manifestly simpler, quicker and less costly.

The laboratory has also found that the three most acceptable methods for the application of the suspected brain tissue on the microscopic slide are: first, the so-called rolling technique in which a piece of brain tissue is rolled over the surface of the slide with a wood applicator; second, the smear technique in which a small piece of tissue is placed on one end of the slide, and is crushed with the aid of another slide and drawn down the length of the slide, creating a homogeneous spread of tissue; third, and perhaps best, the impression method in which a small section of tissue is placed on blotting paper and the slide is applied to the cut surface of the section with just enough pressure to leave a thin film of tissue imposed on the slide. In the impression technique an optimum amount of nerve tissue can be concentrated in a small area without damage to neuronal and interstitial structure (*4*, *8*, *9*, *10*, *11*).

A multitude of differential stains for use on brain-tissue smears for Negri-body examination are being used routinely with varying degrees of success in diagnostic laboratories throughout the country. In comparative studies on most of the staining techniques used for this purpose, we have achieved by far the most satisfactory results with Sellers' stain. Because the methylene blue and basic fuchsin of this stain are dissolved in methyl alcohol, the tissue film requires no preliminary fixation; it is fixed and stained simultaneously. This is probably the most important factor in making the Sellers' technique the most rapid and the most easily handled (*5*).

Since Negri bodies cannot always be found in the brains of animals dying of rabies, it is important that animal inoculation for demonstration of the virus be done on Negri-negative specimens. Extensive surveys of large numbers of rabies cases have shown that 10 to 12 percent of those cases proved positive by mouse inoculation had been missed by direct smear microscopic examination for Negri bodies.

It is therefore strongly recommended that laboratories which furnish rabies diagnostic services be equipped to do animal inoculation tests on Negri-negative brain tissues. In this way, vital assistance is given the physician handling a dogbite case where there is a question of human exposure, and necessary support in the form of more accurate reporting is given to the rabies control authorities who are aiming at eventual eradication of the disease.

The operation is simple and inexpensive. The preferred animal is the white mouse since it is uniformly susceptible, low in cost and easily handled. The intracerebral inoculation of a suspension of infected brain material will produce typical and constant symptoms in 5 to 11 days with the consistent production of Negri bodies (*8, 10, 12*). The details of the test have been standardized for practical use at our laboratory and are available for distribution to all agencies responsible for the diagnosis of rabies (*13*).

Animal brains shipped to diagnostic laboratories are often grossly decomposed on arrival, making it impossible to inject mice without the danger of introducing complicating bacterial infection. Suitable agents for treating suspensions of such contaminated material are 10 percent ether, 0.5 percent phenol, 1:5,000 merthiolate, pure glycerol or 500 units of sodium penicillin G per milliliter of tissue emulsion. All of these agents will kill the contaminating bacterial without affecting the virulence of the virus. Comparative evaluations of these agents in our laboratory have earmarked the penicillin treatment of brain suspensions as the preferred technique. Such suspensions are ready for inoculation within 30 minutes as compared to 2, 6, 6, and 48 hours for tissue emulsions treated with ether, phenol, merthiolate and glycerol, respectively.

Implementing the diagnostic reference services of the Rabies Control Branch, an organized short course in the laboratory diagnosis of rabies is offered twice each year at the laboratories of the Communicable Disease Center, Atlanta, Georgia. This training is open to all grades of employed laboratory personnel including directors and senior staff members. Although first consideration is given to the laboratories of State and local public health departments and other official agencies responsible for the diagnosis of rabies, applicants from hospitals and similar institutions are considered when vacancies occur.

This one-week refresher course is designed essentially for practical laboratory training. The students carry out the various procedures to gain proficiency and to keep abreast of new and improved methods. It is supplemented by lectures and demonstrations. Phases of the course covered include orientation and background, preparation of stains, gross brain dissection, tissue-film preparation and staining, mouse inoculation and symptomatology, mouse brain smears and staining, microscopy (the Negri-body and differential diagnosis—other virus inclusion bodies), cost and materials, review and unknowns.

Canine Rabies Vaccination

One of the principal projects at the laboratory of the Rabies Control Branch is the study of the efficacy of canine rabies vaccination. Current studies in the laboratory and analytical observations of field trials have produced satisfactory evidence that annual vaccination of dogs is an essential means of controlling rabies and should be encouraged to augment other measures such as licensing, quarantine and the elimination of strays.

The following organizations and official agencies have endorsed canine rabies vaccination: American Veterinary Medical Association, American Medical Association, American Public Health Association, American Animal Hospital Association, United States Livestock Sanitary Association, National Research Council, Public Health Service, and Bureau of Animal Industry (*3*).

Those States, counties and municipalities which put the annual vaccination requirement into effect several years ago did so on a scientific basis. Evidence, presented by Johnson of the International Health Division, Rockefeller Foundation, after carefully planned, well-controlled experiments and field studies, showed that immunity is maintained at a high level for 6 months and is effective 1 year after vaccination (*6*). Our experience in the Public Health Service has thus far corroborated the findings of the 9 years of research by the Rockefeller Foundation.

Mass immunization of dogs has been used with excellent results in many communities throughout the country. One of the most forceful demonstrations of the effectiveness of canine vaccination was presented just a year ago during an outbreak of rabies in Memphis, Tenn. Rabies incidence, which had been at a substantial endemic level in Memphis and in Shelby County for years, suddenly began to reach alarming epidemic proportions in the late winter and spring of 1948. By March, positive animal cases were being reported at the rate of more than one a day. The number of cases was twice that reported for the same period in 1947, and four times as many as in 1946. Over 150 persons had undergone the full series of anti-rabic vaccine treatments, which in the first 3½ months exceeded the total number of treatments for any previous entire year. At that time we were called in to assist in the planning and operation of an emergency control program.

It was noted that the disease continued to spread in spite of a strict dog quarantine, adequate stray dog control and a good licensing law. It was estimated that about 8,000 dogs were vaccinated annually. Working swiftly and efficiently, the Memphis and Shelby County Health Departments set up machinery for a voluntary dog-vaccination program by mobilizing the practicing veterinarians of the community and alerting dog owners through every conceivable medium. A series of 70 emergency dog-inoculation clinics were operated over a 6-day period at strategic locations throughout the city and county. The vaccination charge was $1 per dog, regardless of dose. As a result, 23,000 dogs were inoculated during the 6-day emergency program. Added to those vaccinated by veterinarians in their routine practice, preceding and following the campaign, it is estimated that 80 percent of the dog population was immunized.

The results of the Memphis program were phenomenal. In the ensuing months, the positive cases began to drop until the last case of animal rabies and the last human anti-rabic vaccine treatment were reported in July. Both city and county remained entirely free of rabies until March 10, 1949, when the first rabid animal since July 22, 1948, was picked up at the city limits. Seven months without a single case of rabies was a new and refreshing experience for Memphis.

Despite the thorough dog control activites, it was not possible to eliminate rabies from the area until mass immunization was added in the emergency program of 1948. The results of this episode stand as dramatic testimony to the importance of canine vaccination.

Great progress has been made in recent years in the improvement of canine rabies vaccine. The product now in use is a 20-percent phenol and heat-killed brain emulsion vaccine. Its manufacture has been standardized by Federal regulation, and all canine rabies vaccine on the market today is required by the Bureau of Animal Industry to pass the stringent Habel mouse potency test of the Public Health Service.

Investigations in animal rabies vaccination are being continued at the laboratory of Rabies Control Branch, and experimental activities along these lines have been expanded to include studies in the duration of immunity, dosage for maximal immunity response, efficacy of newly developed vaccines inactivated with a variety of chemical substances and by ultraviolet irradiation, and safety and relative antigenicity of experimental live virus vaccines such as the chick embryo vaccine.

Reporting

One of the three primary resolutions adopted by the National Rabies Conference held in Philadelphia in 1947 was "that rabies in animals should be made a reportable disease and the information be properly analyzed and distributed to all the States." Following this resolution, arrangements were made by the Public Health Service to print information concerning incidence of rabies in animals, as well as in man, in PUBLIC HEALTH REPORTS which reaches all disease-control agencies in the country. State health officers were asked to include rabies in animals in their weekly telegraphic reports to the Public Health Service. This important statistical information is compiled and distributed so that each State will have a week-by-week picture of the extent and movement of the infection in neighboring and other States. This service has proved invaluable during the past year in notifying authorities of new foci of infection so that control work could be started before the disease had time to spread.

The State Program

One of the most vital functions of the Veterinary Public Health Division is the assignment of qualified public health veterinarians to State health departments throughout the country. These Public Health Service veterinary officers are responsible for the organization and development of sound rabies control programs in the States to which they are assigned. They establish the extent and limits of the States' problem and set into motion the mechanism of control according to the results of their surveys.

Many State health departments employ full-time veterinarians of their own who cooperate with the Public Health Service. It is urged that this arrangement be effected in every State where rabies is prevalent, since it has been shown that the only States which are beginning to achieve a measure of success are those with programs under the supervision of a qualified public health veterinarian.

These men, whether Federally assigned or State employed, are the keystones in the fight against rabies. Through the offices of the Rabies Control Branch and Veterinary Public Health Division, they report the progress of their respective programs, learn of the problems and activities of other State programs, and obtain latest information on the technical and administrative aspects of effective control procedures. Through State professional societies, they stimulate the interest of the private practicing veterinarians of the State and enlist the active support of practitioners in local control programs. They serve as liaison officers between State diagnostic laboratories and local health units.

In administering the State-wide program, the health department veterinarian coordinates the efforts of local control by encouraging accurate reporting; alerting counties on the presence of rabies in neighboring areas; appointing local rabies inspectors; improving methods for the shipment of specimens to diagnostic laboratories; making canine vaccines available where needed; surveying facilities for collection and impoundment of stray dogs; preparing and distributing educational material throughout the State, and, by frequent visits, advising and consulting with local control authorities on current policies and methodology of control practices.

The Local Program

The actual legwork of control operations is done at the local level. Field demonstrations have proved that local programs work best on a county-wide basis or on a multicounty unit basis according to the extent of the local health jurisdiction.

It is suggested that all local rabies control programs include three broad measures. The first is *impounding and destruction of all stray* *and ownerless dogs.* This requires the operation of a local pound or humane shelter where stray dogs may be kept for a specified number of days and, if unclaimed at the end of that period, humanely destroyed. Strays should be collected by teams of dog wardens and assistants using trucks with proper enclosures. The second is *annual anti-rabies vaccination of all dogs.* The importance of canine vaccination in an efficient control program is now a firmly established fact and needs only a well-coordinated educational campaign to bring this fact to the public. The third is *registration or licensing of all dogs.* Licensing of all dogs in a community is an important adjunct of a successful control program. If properly enforced, it serves to defray the expenses for the over-all control program, assures a reasonably accurate dog census, rids the area of ownerless strays, and places the responsibility of dog control activities squarely on the dog owner.

The foregoing are essentials of a successful control program. If there is a local ordinance with or without the benefit of State enabling legislation, it should be administered by the local health department and enforced by city and county police officials. The ordinance should contain enforcing clauses. It should be well conceived and simply drafted and contain all important details with regard to its operation. The health officials should strive to launch an effective educational campaign in conjunction with any regulatory measures. This latter step is paramount for the success of the program.

Some additional provisions which may be incorporated into the program are:

1. Except in heavily populated cities, vaccinated dogs, when properly tagged, may be allowed at large 30 days after vaccination. The vaccine is not fully effective until the end of that time.
2. In the face of an outbreak of rabies in the community, a strict quarantine should be placed on all dogs, requiring that they be confined at home or kept on a leash when out of doors.
3. Dogs under 6 months of age, which are particularly susceptible to rabies and not as readily immunized as adult dogs, should be confined.
4. Biting dogs and suspected rabid animals should be impounded and held under observation for 12 to 14 days so that proper medical disposition of dogbite and suspected human exposure cases may be effected. Dogs exposed to rabies should be destroyed or kept confined under observation for 6 months.
5. In case of rabies outbreaks in wild animals, such as foxes, adequate trapping programs should be instituted in cooperation with the State wildlife conservation authorities.

It should be pointed out again that adequate diagnostic facilities and human anti-rabies vaccine should be made available by the local health unit or branch laboratory of the State health department. All cases of rabies in man and animals should be reported to the local health officials.

Vaccination as a prerequisite to registration and combining the two as a single operation is a sound idea and will make the control program simpler and less cumbersome. The dog owner will appreciate the fact that he has only one trip to make each year when he can have his dog vaccinated and registered at the same time. He should be issued a single official uniform tag for the dog's collar and a single official uniform certificate of vaccination. The certificate can be made in triplicate, with the original for the dog owner, one copy for the health department's registration files and one copy for the veterinarian. A single fee should be charged which will be low enough to cover all classes of dog owners and high enough to defray expenses of vaccination services and the operation of stray dog control activities.

Another suggestion is that dog inoculation clinics be operated by veterinarians duly authorized by the health department. The clinics can be held at strategic points throughout the city or county over a 1- or 2-week period. It has been found that the effective control of rabies is enhanced by the desired immunization procedure of getting as many dogs as possible vaccinated in the shortest possible period of time. Temporary neighborhood clinics have the added advantage of making it more convenient for people to get their dogs vaccinated.

Education

No matter how soundly a local control program is developed and no matter how well an ordinance is drafted, it still must be supported by the people if it is to succeed. This can be achieved only by a well-planned educational program. In speaking of rabies, Denison has stated "there is no disease about which the public is more misinformed" (7). It is in the province of all of us as health workers to dispel superstitions, prejudices and misinformation. People will be happy to cooperate if they learn that canine vaccination is of proved value, that dog-registration ordinances are for their own protection in combating a deadly disease and not just another devious form of government revenue, that the conception of "dog days" during the hot summer months has no bearing on rabies, that the use of the "mad-stone" is a superstitious fantasy, and that dogs do not just "get rabies" spontaneously but as the result of exposure to another rabid animal.

In planning campaigns for many communities, we have successfully used such media as newspapers, radio, television, placards, sound trucks, mimeographed schedules of clinic stations, printed pamphlets, church announcements, and talks before civic and school groups in which audio-visual aids were utilized. In this connection, the Production Division in cooperation with the Rabies Control Branch of the Communicable Disease Center is engaged in the production of audio-visual media for disseminating information on rabies-control methods. Two sound filmstrips on rabies were released during the past year and copies of each have been widely distributed throughout the country. They have proved to be valuable adjuncts in local control operations.

The first filmstrip, "The Fight Against Rabies", acquaints the audience with symptoms of disease in animals and man; refutes popular misconceptions such as the influence of climate and season on rabies prevalence; stresses the 100 percent fatality rate of the disease; presents the hazards of an uncontrolled epidemic; gives mode of transmission, and suggests means by which citizens can cooperate with control authorities in combating its introduction and spread through a community. Many of the points on control are illustrated by simple dramatization. Forceful material for mass immunization of dogs is also presented. The filmstrip provides excellent orientation for health department workers as well as being an effective educational device for the layman.

The second filmstrip, "The Laboratory Diagnosis of Rabies", is being used as a training aid for public-health laboratory workers in bringing to them visual demonstrations of the most efficient and practical techniques in the laboratory diagnosis of rabies.

Now in the script stage of production is a new motion-picture film on rabies eradication which may be released later this year.

The Wildlife Problem

In many sections of the United States the rabies problem is complicated by the presence of the disease in wildlife. Wild animal rabies is now present in the States of the Appalachian Range from New York to Georgia, westward in the Southern tier to eastern Texas, and in the Midwestern belt that extends from western Pennsylvania through Iowa. Most of the cases reported are foxes, but civet cats, skunks and coyotes are also reported.

Without the problem of wildlife rabies, eradication of this disease from the United States would be a substantially easier task. Although we have a good vaccine for prophylactic measures in domestic animals, mass immunization tactics cannot be applied to the susceptible wildlife. In areas where wildlife rabies exists, coordinated programs between public health and wildlife conservation departments can be effectively developed.

Organized trapping programs sponsored by State game and fish commissions assisted by the Fish and Wildlife Service have produced good results in smothering serious outbreaks of rabies in wildlife. "Encirclement" and "thinning out" trapping techniques are suggested by wildlife conservation authorities and are based on the observation that rabies epizootics occur when there is an overpopulation of foxes.

The disease in foxes, when present in epizootic proportions, will run its course in a year or more, the resulting mortality reducing the number of foxes until they are no longer a source of danger. However, besides the devastating effect of the disease in the foxes themselves, there is always the danger of some affected animals leaving the area and setting off a chain reaction of infection in a susceptible animal population at some distant place. There have been a few instances on record where infected wildlife served as the link in the transmission of rabies between isolated animal populations. The objective in trapping procedures is to reduce the fox population more quickly than the disease will and thereby shorten the period of infection and the danger of its spread to other animals and man.

Additional Control Services

In addition to the services available by the Communicable Disease Center for the control of rabies, activities of the National Institutes of Health, Foreign Quarantine Division, and Public Health Service Regional Offices are serving to strengthen the national control program.

Those aspects of rabies and its control which relate to the human disease are being studied in the Institute of Microbiology, National Institutes of Health. Here basic information is being sought through research of the disease in man. Another important activity at the Institute is the routine potency testing, improvement and establishment of minimum requirements for rabies biologics production.

At the end of the war, the Armed Forces requested that the Public Health Service include animal rabies provisions in their quarantine regulations. These regulations, now in effect, are administered by the Foreign Quarantine Division and require that all animal pets coming from countries where rabies is known to exist be vaccinated not more than 6 months prior to debarkation at the port of entry.

Throughout the country, Public Health Service Regional Offices are available for consultation on rabies and other disease control problems. Regional office staffs stimulate reporting, and encourage and assist in coordinating control activities in the regions. For States which require financial aid in the development of rabies control programs, grants-in-aid funds are available from the Public Health Service under P. L. 410, sec. 314c, 78th Congress for the operation of general health programs. These grants to the States are administered by the Regional Offices.

Conclusion

The eventual eradication of rabies from the United States is not an unobtainable goal. Its achievement can mark one of man's great victories over disease. The nature and extent of the problem is well known, the implements for attaining it are available and the strategy has been planned. It is felt that the integration of the services outlined in the foregoing pages with those of the State and local rabies control agencies in a unified national program will provide the *modus operandi* to reach this goal.

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Pilot Mental Health Clinic

First Annual Report of Prince Georges County Clinic

By Mabel Ross, M. D.[*]

The Prince Georges County Mental Health Clinic is a demonstration clinic under the National Mental Health Act and is financed by congressional appropriation for this purpose. It was established in January 1948, in Prince Georges County, Maryland, which includes suburban and rural areas in its 482 square miles and has a population of over 150,000.

The clinic was set up at the request of citizens and organizations of the county, who, with the county and State health departments, worked out the details of organization with the Mental Hygiene Division of the Federal Public Health Service. A group of interested citizens formed an interim board and, among other things, made the arrangements between the county and the University of Maryland to have the clinic housed in a building on the university campus. This group then organized a meeting of the representatives of organizations in the county which were interested in mental health. Under a constitution adopted at this meeting the representatives formed a committee-at-large to meet annually and elect the members of the advisory board. The 12-member advisory board of the Mental Health Clinic meets monthly with the clinic staff in an advisory capacity and acts as liaison with the community.

This pilot clinic was established to study methods through which the mental health program can be made part of the over-all health program for a county and to determine methods which communities can apply to attack the factors contributing to the high incidence of psychiatric disorders. Toward this end it is necessary to service individual cases in order to demonstrate the value of psychiatric treatment in already existing disorders and also to develop confidence in the mental health principles stressed by the clinic. Behind and beyond the individual service, each case serves as a basis for study and research of the community factors contributing to the existing illness and the possible points at which preventive action might have made psychiatric treatment unnecessary. As an important part of the treatment of those referred to the clinic, the existing community facilities are given an active role in the treatment plan. This activity has definite educational value and makes available the basic principles of mental health to a wider group than just those patients who are referred to the clinic.

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The Prince Georges County Mental Health Clinic opened officially January 19, 1948, although one of the psychiatric social workers had been working with the County Health Department for the preceding 8 weeks. The present staff consists of two psychiatrists, two psychiatric social workers, one clinical psychologist, one mental health nurse, and three clerical staff members. The clinic sees patients only by appointment, which can be applied for by any resident of the county.

The activity of the clinic is divided into three parts for the purpose of this report: individual service and treatment; community activities; demonstration.

Individual Service and Treatment

From January 19, 1948, through January 18, 1949, 423 patients were seen by the Prince Georges County Mental Health Clinic. Of these, 281 were children under 18 years, and 142 were adults. These patients were referred by physicians, schools, the probation department, social agencies, ministers, and other local groups as well as by friends and relatives. Some of them came on their own initiative. Twelve and one-half percent were referred by local physicians who frequently carried on treatment of these patients in collaboration with the mental health clinic; 37½ percent were referred by friends, relatives, or came on their own initiative. Many learned of the clinic from publicity in newspapers and magazines, but the majority learned of it from other patients. At the end of the year there was a waiting list of 31 patients to be seen as soon as appointments could be arranged. All of the time allotted for examination and treatment is now being utilized, and the rate at which patients are discharged is somewhat less than the rate at which applications are being made. Treatment time is concentrated on individuals whose problems are interfering with satisfactory functioning at work, home, or school. The seriously ill are referred to other facilities for the necessary intensive psychiatric treatment.

During the year there were 18 cases which would have required care in a general or mental hospital or in an institution had it not been for the clinic. Four patients who had attempted suicide are now making a reasonably good social adjustment. Five potential divorces have thus far been avoided and in at least 16 cases the economic status of the family has definitely improved either because the patients were able to accept employment or change to full-time employment. In almost all instances this was not due solely to treatment at the clinic but was accomplished with the cooperation of appropriate community facilities.

As a result of the study of the cases referred to the clinic we are convinced that some of the more serious cases could have been prevented had there been available in the past adjustment clinics in the schools, better guidance of parents through pediatricians or public health nurses, and improved child welfare services to deal with early problems of foster home or other placement of children.

Community Activities

The relationship between the clinic and the health department of Prince Georges County existed before the actual opening of the clinic. To study ways of including the mental health program in the general health program of the county, the mental health nurse of the clinic has carried out several activities with the cooperation of the staffs of the mental health clinic and the health department. Liaison with the supervisory and staff nurses of the health department included conferences concerning patients to be referred to the mental health clinic or problems in their own case load. Participation in the health department in-service educational program has been through mental hygiene conferences and by the attendance of public health nurses at the mental health clinic staff conferences.

Other activities included organization of mothers' discussion groups in prenatal and well baby clinics in the county. These groups of 6 to 10 mothers have met weekly or monthly to discuss various aspects of child care and development. Individual conferences were held with mothers and fathers attending the well baby clinic, with discussions centering around questions brought by the parents, such as: "Why does my 2-year-old take things away from the 6-month-old baby?" "Will my baby be 'spoiled' if I pick her up when she cries?" "My little girl, age 3, will not eat all of her food. Does she need a tonic?"

Recently, conferences were held with the public health nurses, and they indicated an interest in extending such discussion groups as part of the general health program. This is in keeping with the belief of the health department and the clinic that neither the patients nor the staff should think of mental health as separate from general health. The aim of a mental health demonstration is to be so incorporated into all health, educational, industrial, and community thinking that it is no longer recognizable as an entity.

To study the problems of a traveling clinic in a strictly rural area, a part-time clinic was established in November 1948 in Upper Marlboro, where the transportation problems are greater. This clinic has been held regularly twice a month.

The schools have sought help in individual cases and also have brought group problems for consultation. Discussion between the clinical psychologist and school representatives concerning individual children referred to the clinic, led in the summer of 1948 to setting up a reading class by the county department of education with the cooperation of the mental health clinic. As a result, the schools have set up some classes and plan to continue the summer sessions. Other problems of maladjusted children needing special education are being studied by the clinic and schools. Conferences were held in five schools, and the referred problems were used as the starting points for discussion. These were enthusiastically received.

The Parent-Teachers Association groups requested assistance in county institutes. They feel it is their responsibility to make teachers and parents aware that help is available for some of the school problems.

Although the courts have referred few cases, it has been possible to set up a good working relationship with the probation department. Despite being seriously overloaded, the men of this department have taken time to discuss cases before and after referring them to the clinic.

Other community activities included consultative conferences with the Welfare Board, Catholic Charities, Social Service League, Vocational Rehabilitation Service, and the Maryland State Employment Service.

The clinic staff has made many speeches to service clubs, Parent-Teachers Association, women's groups, university classes, homemakers' representatives, the Community Council, and the Medical Society. These talks almost invariably were followed by periods of discussion. Recognizing that all interested organizations in the county now have a working knowledge of the clinics, it is felt that they want more than a speech. For this reason, the clinic staff will try to work with the interested group in panel discussions, institutes, and working conferences planned toward action more than discussion of the clinic itself.

Demonstration

During the past year the clinic has had professional visitors from other States and other countries as well as from its own county and other parts of Maryland. Among them were psychiatrists, psychologists, nurses, social workers, and health officers. They came from private hospitals, other county clinics, State hospitals, and administrative departments. They came from New York, Virginia, West Virginia, North Carolina, Illinois, Iowa, Colorado, Texas, Arizona, and Oregon. They also came from China, Colombia, and Scotland.

While the visitors were interested in the functioning of the clinic per se, practically all hoped the demonstration clinic would be able to answer the problems in their own situations. Most of their questions centered around the community relations of the clinic—what agencies are worked with directly, both on a referral and a consultative basis; what were the extramural activities, both consultative and educational; what were the mechanisms of cooperation with the community agencies; how can cooperation with the local medical society be established and maintained; how can the interest and support of the community and local agencies be fostered?

There have been nonprofessional visitors also. Telephone inquiries regarding the clinic come almost daily—usually from out of the county—and here an attempt is made by the receptionist to direct the caller to other clinics. Publicity has also brought letters from all over the country—some curious and some appealing. Each letter has been answered, usually with referral to the State Mental Health Authority for information as to nearby clinics In two instances patients suddenly appeared—one from Pennsylvania (referred to and aided by a mental hygiene clinic in that State) and one from Ohio (referred to the State Mental Health Authority). Most of the publicity resulted from an article in a national women's magazine stressing the community participation in planning the clinic and the individual service.

There also were letters from cities and counties in North Dakota, South Dakota, Ohio, Wisconsin and California, requesting information about setting up similar mental health clinics.

It appears that this clinic has begun to serve its function as a demonstration to other counties in other States throughout the country. With every bit of progress, wider possibilities open for community activity. With every report there is increasing evidence of the great numbers of people throughout the country who are seeking some pattern and direction in establishing mental health services. Many questions have been about community cooperation, and it has been a source of pride to the clinic staff to be able to stress the active part played by the people of Prince Georges County in having the mental health clinic set up in this county, and to point to the continued interest and active support of the advisory board. However, the most unusual feature of this demonstration clinic is the committee-at-large, representing all interested groups in the area and expressing a community sense of responsibility. We hope that, with the continued help of the people in the county, more community methods will be found to serve as patterns for the development of other community-wide programs for mental health.

Notifiable Diseases, Year 1948

The figures in the following table are the totals of the monthly morbidity reports received from State health authorities for the year 1948. These reports are preliminary and the figures are more or less incomplete and subject to correction by final reports. The figures may be assumed to represent the civilian population only, although in some instances a few cases in the military population may be included. The comparisons made are with similar preliminary reports; but, owing to population shifts in many States since the 1940 census, the figures for some States may not be comparable with those for prior years, especially for certain diseases. Each State health officer has been requested to include in the monthly report for his State all diseases that are required by law or regulation to be reported in the State, although some do not do so. The list of diseases required to be reported is not the same for each State. Only 11 of the common communicable diseases are notifiable in all the States. In some instances cases are reported, in some States, of diseases that are not required by law or regulation to be reported and the figures are included although manifestly incomplete. There are also variations among the States in the degree of, and checks on, the completeness of reporting of cases of the notifiable diseases; therefore comparisons as between States may not be justified for certain diseases. As compared with the deaths, incomplete case reports are obvious for such diseases as malaria, pellagra, pneumonia, and tuberculosis, while in many States other diseases, such as puerperal septicemia, rheumatic fever, and Vincent's infection, are not reportable.

In spite of these and other deficiencies inherent in morbidity reporting, these monthly reports, which are published quarterly and annually in consolidated form, have proved of value in presenting early information regarding the reported incidence of a large group of diseases and in indicating trends by providing a comparison with similar preliminary figures for prior years. The table gives a general picture of the geographic distribution of certain diseases, as the States are arranged by geographic areas.

Leaders are used in the table to indicate that no case of the disease was reported.

Consolidated monthly State morbidity reports for the year 1948

Division and State	Anthrax	Chickenpox	Conjunctivitis [1]	Diphtheria*	Dysentery, amebic	Dysentery, bacillary	Dysentery, undefined	Encephalitis, infectious	German measles	Hookworm disease	Influenza	Malaria [2]	Measles*	Meningitis, meningococcal*	Mumps	Ophthalmia [3]	Pellagra	Pneumonia, all forms
NEW ENGLAND																		
Maine	0	3,374	--------	32	--------	49	--------	2	153	1	77	4	2,967	[4] 17	952	--------	--------	706
New Hampshire	1	790	--------	1	--------	--------	--------	--------	46	--------	49	--------	1,228	12	432	--------	--------	72
Vermont	0	2,983	--------	8	--------	2	--------	1	362	--------	8	--------	1,648	9	579	--------	--------	70
Massachusetts	3	18,127	166	303	4	121	--------	34	1,076	--------	--------	23	37,108	73	14,216	277	--------	[5] 1,393
Rhode Island	0	1,555	1	15	2	10	--------	1	23	--------	13	10	623	11	723	--------	1	264
Connecticut	1	10,054	175	20	12	7	--------	9	356	1	95	17	3,281	64	4,441	1	--------	1,858
MIDDLE ATLANTIC																		
New York	8	26,523	48	330	463	371	--------	45	[6] 2,681	[6] 113	[6] 233	76	57,776	269	[6] 9,693	41	--------	11,063
New Jersey	16	27,098	--------	123	59	4	1	3	2,128	--------	207	36	42,855	97	32,152	5	--------	3,189
Pennsylvania	16	25,820	--------	328	13	13	1	16	--------	--------	128	--------	39,185	223	15,596	8	--------	3,888
EAST NORTH CENTRAL																		
Ohio	0	18,004	10	349	74	42	10	--------	446	--------	121	7	25,755	136	3,363	471	1	2,446
Indiana	0	3,638	3	433	14	19	8	43	226	--------	408	10	17,448	36	3,933	--------	1	500
Illinois	0	15,925	151	89	338	146	--------	83	545	4	148	[7] 26	41,796	290	11,704	47	--------	4,776
Michigan	0	20,478	171	127	518	117	--------	5	783	38	78	26	42,952	106	13,202	7	--------	2,075
Wisconsin	0	33,513	--------	40	14	--------	--------	5	1,170	--------	1,215	11	37,273	78	18,681	5	--------	[5] 412

WEST NORTH CENTRAL																		
Minnesota	0	2,639	107	129	37	110	7	6		5	24	80	9,339	56				341
Iowa	0	[8]3,400		60	12	1		19	1		43	12	10,151	65	3,115			116
Missouri	0	3,264	1	182			38	4	7		222	23	6,176	86	5,550	1		946
North Dakota	0	696	31	33	59			34			54		1,518	19				867
South Dakota	1	546		25				30			3	1	1,014	13	144			72
Nebraska	0	1,776		32	24	2		8			442	3	3,834	23	729			90
Kansas	0	5,075	47	133	4	7	2	21	114		760	2	1,354	26	3,100			571
SOUTH ATLANTIC																		
Delaware	1	318		12				3					1,112	9	555			20
Maryland	0	3,686		180	3	26	143	2	160		73	5	12,334	48	4,967	18	4	1,433
District of Columbia	0	967		13	13	84					2	3	3,058	19	230			766
Virginia	0	3,814		265	13		4,476	9			19,442	39	7,749	91	3,409		6	2,876
West Virginia	0	1,196		205		10		1	236		2,200	1	5,398	73	1,049	2		503
North Carolina	0			509	31	37	1	6				151	1,173	76				
South Carolina	0	2,690		606	65	559		22	239	1,917	20,816	3,668	2,912	34	4,295	22	602	5,449
Georgia	0	1,629	38	480	21	254	17	7		5,168	1,296	95	1,466	40	2,330	1	79	1,726
Florida	0	1,402	24	327	153	179	40	5	56	5,008	366	111	4,802	48	1,329	26	10	551
EAST SOUTH CENTRAL																		
Kentucky	1	1,190	14	357	17	87		2	653	8	62	67	4,410	119	1,366	2		1,571
Tennessee	0	2,080	1	292	314	106	24	28	102	7	2,363	80	4,629	120	1,132	19	34	2,485
Alabama	0	1,439		614	26			9	35		6,924	319	2,042	100	818		17	2,537
Mississippi	0	[9]318		266	109	192		8		3,210	745	120	1,304	56	371	29	12	924
WEST SOUTH CENTRAL																		
Arkansas	0	1,891		156	292	98	1,237	1	94	12	7,795	636	4,327	34	898	3	3	1,652
Louisiana	1	354		136	361	7		5	6	744	1,137	50	1,542	61	225	2	2	1,893
Oklahoma	0	1,418		163	46	16	81	2	172	22	3,971	403	1,626	61	889	2	18	1,058
Texas	0	[9]14,563		924	839	20,081	7,796	3			58,604	3,594	51,121	242	7,815	66	193	10,863
MOUNTAIN																		
Montana	0	2,597	41	72	3	5		2	107		475	1	2,539	13	2,898	1		263
Idaho	0	1,242	52	74	3	3	7		187		933		1,770	11	2,720			322
Wyoming	0	870	7	12	2			4	173		33		2,400	7	657			110
Colorado	0	5,200		145	8	67		2	389		1,604	8	10,946	34	7,282			1,060
New Mexico	1	550	25	79	15	44	49	2	66		115	5	1,222	9	723	8	5	853
Arizona	1	1,679	15	161	39	305	981	6	364		11,225	15	5,291	14	1,012	7	11	1,615
Utah	0	3,889		[10]160	2	5			120	[11]2	762	2	[10]7,553	4	1,953			201
Nevada	0	191	27	1	1	3	5	2	25		174	2	384	6	210		2	40
PACIFIC																		
Washington	1	8,620	218	91	23	11	154	2	706		3,267	3	12,914	46	12,246			912
Oregon	0	1,862	77	75	149	35	7	3			2,940	3	6,436	23	2,595			1,046
California	1	40,539	8	443	315	492		70	4,280		14,153	49	65,069	338	32,483	7		[5]1,680
Total	53	331,431	1,458	9,610	4,510	23,727	15,085	575	18,287	16,260	165,805	9,797	613,810	[4]3,375	236,764	1,078	1,081	80,072
Year 1947	71	317,565	1,863	12,405	3,130	16,979	9,516	669	12,657	12,972	443,339	17,317	221,115	3,399	155,852	1,196	1,555	77,995
Median 1943–47	44	301,423	1,329	14,943	3,341	30,872	9,421	669	38,339	15,236	452,101	53,575	612,068	8,035	175,643	1,671	2,891	198,777
Alaska		214		2					33		300		76	7	105			97
Hawaii Territory		1,941	21	1	9	58			221	9	11	4	2,429	1	3,251			[5]78
Panama Canal Zone [13]		148		82	53	56			4			1,729	134	31	59			[12]206

See footnotes on pages 805 and 806

Consolidated monthly State morbidity reports for year 1948—Continued

Division and State	Poliomyelitis*	Rabies in man	Rheumatic fever	Rocky Mountain spotted fever	Scarlet fever*	Septic sore throat	Smallpox*	Tetanus	Trachoma	Trichinosis	Tuberculosis, all forms*	Tuberculosis, respiratory	Tularemia	Typhoid fever*	Paratyphoid fever	Typhus fever, endemic	Undulant fever*	Vincent's infection	Whooping Cough*
NEW ENGLAND																			
Maine	40		2		630	41				7	504	478		11	9	2	10	21	793
New Hampshire	23				167	127		1			164			2	[14] 6		7	29	309
Vermont	26				200	12		1			111			5	6		36	4	1,326
Massachusetts	177				6,053	82		8	3	41	2,998	2,814	5	34	75		37		2,772
Rhode Island	8		132		346	41		2		8	608	483		5	10		10	10	330
Connecticut	[4] 121				1,094	254		11		20	1,605	1,486		12	[14] 10		92		724
MIDDLE ATLANTIC																			
New York	1,402			21	[15] 7,897	([16])		22		238	14,623	[4] 13,777		99	[14] 61	19	246		5,722
New Jersey	807			11	2,505	141		10		28	3,136		1	34	3	1	49		2,604
Pennsylvania	741		1,108	13	7,795			2		16	4,949		9	186	[14] 29		92		4,100
EAST NORTH CENTRAL																			
Ohio	1,173		139	6	10,153	39	2	20	1	18	4,717		24	132	17	1	191	24	2,919
Indiana	397	2	15	14	2,024	37	3	11	4		2,507	2,346	45	58	7		70	17	968
Illinois	1,101		151	17	4,514	77		18	9	11	6,959	6,447	54	89	10		515	188	2,199
Michigan	772	1	588		5,934	515		24		7	6,109		5	52	[14] 139		221		2,668
Wisconsin	651			1	2,216	195	2		2		2,280		4	15	3		305		2,841
WEST NORTH CENTRAL																			
Minnesota	1,425		106	1	1,629	182		7	19	12	3,397		3	24	[14] 62		229	52	771
Iowa	1,260			3	1,280	43				1	741		4	18	1		412		463
Missouri	[4] 319		62	9	[4] 1,125	71	[4] 3	12	592		2,697		74	75	5	6	82	5	732
North Dakota	127		3		260		3		13		345	325		12	2		5	34	304
South Dakota	988			4	137	12		1	32		231		3	2	1		67	3	129
Nebraska	718		7		[16] 769	([16])	4		1	1	471		2	10			93		209
Kansas	324		2	3	1,024	32	8	9	1		1,103	1,078	13	17	4	1	129	120	1,460
SOUTH ATLANTIC																			
Delaware	128			5	162	1					347	347		9			2		61
Maryland	156		81	60	901	87		7		1	3,324	2,943	6	35	[14] 4	2	44	14	836
District of Columbia	169			5	351					1			5	16	12		2		233
Virginia	573		1	61	899	2,205		8			3,943	3,892	58	113	25	6	82		2,262
West Virginia	179		10	13	851	68	1	4	2		2,309	2,299	2	65	4		5	6	962
North Carolina	2,518			74	1,100	30	3				3,277	3,166	42	62	10	45	16		1,977
South Carolina	[4] 380		377	7	239	7,166		9			467		23	70	10	36	22		3,294
Georgia	237	1	69	32	849	230	1	45			3,170	3,106	80	117	70	225	146	49	539
Florida	283	1			359	126		73	69		3,162	2,393	20	105	[14] 135	170	74	167	731

EAST SOUTH CENTRAL																			
Kentucky	[4] 202	4	55	17	1,366	46	4	2	84	------	2,052	2,032	7	138	8	19	21	35	754
Tennessee	377	5	73	35	1,598	429	------	41	1	1	5,745	------	65	128	9	14	69	269	1,273
Alabama	214	1	------	16	651	------	------	43	------	------	2,788	------	19	54	4	172	74	------	1,255
Mississippi	162	2	20	1	269	------	[4] 2	5	2	------	2,800	2,721	49	65	3	42	61	------	143
WEST SOUTH CENTRAL																			
Arkansas	145	1	7	3	262	1,190	1	27	102	5	2,427	2,393	163	111	4	6	44	------	1,267
Louisiana	156	3	55	3	192	46	5	38	------	------	3,157	3,034	40	154	11	53	37	------	250
Oklahoma	362	------	------	27	595	166	[4] 1	6	322	------	2,230	2,187	82	72	[14] 57	1	78	11	1,054
Texas	1,765	5	------	1	1,296	3,593	2	------	120	------	13,298	------	74	318	53	344	561	------	12,053
MOUNTAIN																			
Montana	71	------	7	2	510	78	1	------	104	4	718	571	11	11	1	------	4	2	346
Idaho	119	------	51	7	218	306	5	1	111	------	243	------	1	8	10	------	29	28	289
Wyoming	82	------	4	14	118	6	1	1	------	------	69	20	31	7	------	------	11	14	157
Colorado	124	------	126	21	757	418	2	2	------	------	1,561	------	8	36	16	------	249	38	1,833
New Mexico	81	------	20	1	263	21	------	1	68	------	[10] 1,535	[10] 1,480	3	89	------	------	6	------	661
Arizona	170	------	40	------	179	204	2	------	478	------	2,357	2,286	2	27	3	------	18	------	1,235
Utah	213	------	102	4	512	31	------	1	1	------	[10] 126	[10] 120	[10] 45	2	[14] 5	------	[10] 92	------	[10] 683
Nevada	25	------	1	1	51	30	------	------	6	------	64	8	------	------	------	------	2	26	27
PACIFIC																			
Washington	385	------	433	------	1,856	103	------	1	17	2	2,360	------	3	12	[14] 17	------	43	452	894
Oregon	219	------	67	10	787	216	------	1	5	------	830	771	1	20	8	------	39	------	1,012
California	[4] 5,857	------	728	3	3,719	580	------	47	33	39	8,886	8,269	7	169	118	19	157	------	3,710
Total	[4] 27,902	26	4,542	526	[4] 78,662	19,277	[4] 56	522	2,202	461	133,500	[4] 73,266	1,093	2,905	[14] 1,057	1,184	4,886	1,618	74,294
Year 1947	10,734	21	4,386	565	84,379	15,905	173	488	1,103	428	130,474	70,056	1,360	3,062	1,006	1,901	6,147	2,332	155,991
Median 1943–47	13,514	27	4,386	452	142,274	9,525	356	439	1,618	317	118,307	67,824	887	4,221	741	4,517	4,959	2,332	132,814
Alaska	1	------	26	------	49	29	------	------	------	------	192	181	------	2	------	------	------	5	146
Hawaii Territory	1	------	16	------	48	33	------	11	2	------	1,072	1,024	------	2	3	21	1	------	524
Panama Canal Zone [12]	16	------	------	------	1	1	([17])	5	------	------	[13] 41	------	------	20	4	[17] 7	1	------	[13] 11

Footnotes to Tables on Pages 802 to 805

*Diseases marked with an asterisk (*) are reportable by law or regulation in all the States, including the District of Columbia. Typhoid fever is reportable in all the States; paratyphoid fever in all except 6 States. Syphilis is reportable in all the States and the District of Columbia but is not included in the table. Some States have increased and some have reduced the list of reportable diseases since the latest published compilation of reportable diseases (Pub. Health Rep. 59: 317–340 (1944). Reprint No. 2544.

[1] Includes cases of kerato- and suppurative conjunctivitis and of pink eye.

[2] In a few States practically all cases contracted outside the United States.

[3] All cases reported as ophthalmia neonatorum since July 1, 1948. Prior reports included some cases reported as "ophthalmia."

[4] Figures corrected by later reports.

[5] Lobar pneumonia only.

[6] New York City only.

[7] Exclusive of cases artificially induced.

[8] Reports of chickenpox not received from Iowa for the months of July, August, September, and October, 1948.

[9] Reported January–June 1948 (inclusive) only.

[10] Includes nonresident cases.

[11] Contracted out-of-State.

[12] Includes the cities of Colon and Panama.

[13] In the Canal Zone only.

[14] Includes cases reported as salmonella infection.

Footnotes to Tables—Continued

[15] Includes septic sore throat

[16] Included in scarlet fever

[17] The report of a case of smallpox in the Panama Canal Zone for the first quarter of 1948 (Pub. Health Rep. 63: 953 (1948)) was an error Also 1 case of typhus fever should have been recorded for the Canal Zone for that quarter

The following list includes certain rare conditions, diseases of restricted geographical distribution, and those reportable in or reported by only a few States, last year's figures in parentheses (where no figures are given, no cases were reported last year, or the disease was not included in last year's published tabulation)

Actinomycosis. Maine 1, Massachusetts 2 (1), New York 6, Indiana 1, Michigan 3, Minnesota 5 (16), South Dakota 5, Nebraska 1 (1), Kentucky 1, Tennessee 1, Idaho 2, Nevada 3 (1), Hawaii Territory 1 (1)

Botulism New Jersey 3 (1), Minnesota 1, Tennessee 1 (2), Colorado 5 (1), New Mexico 9 (6), Oregon 3 (2), California 6 (6), Alaska 2

Cancer North Dakota 780, Kansas 3,962, South Carolina 1,460, Georgia 222, Florida 1,880, Kentucky 22, Tennessee 2,917, Alabama 3,476, Mississippi 1,545, Arkansas 677, Louisiana 2,130, Montana 926, Idaho 831, New Mexico 643, Utah 271, Nevada 7

Coccidioidomycosis Kansas 1, Oklahoma 1, New Mexico 1, Arizona 15 (2), California 66 (54)

Colorado tick fever Colorado 67 (60)

Dengue Virginia 1, South Carolina 7 (14), Florida 1, Mississippi 1 (1), Oklahoma 1, Texas 14 (19)

Dermatitis New Hampshire 48 (15), Missouri 37 (117), Kentucky 150 (mycotic dermatitis), Arkansas 3 (3)

Diarrhea Rhode Island 5, Connecticut 25, New York 170 (278), New Jersey 3 (41), Pennsylvania 288 (138) includes gastroenteritis, Ohio 1,311 (709) includes enteritis, Indiana 20 (4) includes enteritis, Illinois 54 (92), Michigan 101 (17), Iowa 1, Kansas 48 (116) includes enteritis, Maryland 36 (96), West Virginia 8 includes enteritis, South Carolina 11,656 (12,846), Florida 191 (68), Kentucky 17 (74) includes enteritis, Oklahoma 7 (2), Idaho 177 (2) includes enteritis, Colorado 24 (3) enteritis, New Mexico 219 (120), Utah 1, Nevada 1 enteritis, Washington 31 (83), California 118 (168), Alaska 54 includes enteritis

Dog bite Massachusetts 5,936, Illinois 14,983 (13,246) includes all animals, Michigan 9,323 (8,034), Arkansas 639 (504) includes all animals

Encephalitis, other forms Maine 1, Rhode Island 2, Connecticut 2, New York 7, Ohio 23, Michigan 87, Nebraska 1, Delaware 1, Maryland 15, Florida 24, Kentucky 1, Idaho 7, Colorado 13, New Mexico 11, Arizona 1, Washington 12, Panama Canal Zone 1.

Erysipelas New Hampshire 4, Vermont 1, Connecticut 17, Ohio 36, Indiana 12, Illinois 192, Michigan 92, Wisconsin 60, Minnesota 3, North Dakota 11, South Dakota 12, Nebraska 1, Kansas 10, Maryland 21, Florida 52, Kentucky 10, Tennessee 33, Arkansas 22, Louisiana 9, Oklahoma 4, Montana 10, Idaho 20, Colorado 50, New Mexico 3, Utah 2, Nevada 1, Washington 16, Oregon, 30 Alaska 2, Hawaii Territory 12

Favus Florida 1, Kentucky 5 (3)

Filariasis New York 1.

Food poisoning Maine 12 (3), Connecticut 1, New York 595, New Jersey 115 (20) includes cases reported as food infection, Ohio 13 (23), Indiana 6 (18), Illinois 89 (79) includes cases reported as food infection, Minnesota 301 (124), Kansas 5, West Virginia 2, Florida 12, Louisiana 8 (20), Oklahoma 50 (8), Idaho 13 (6), Colorado 367 (7), New Mexico 27 (29), Washington 73 (481), Oregon 17 (48), California 637 (1,093)

Granuloma inguinale Missouri 9 (10), West Virginia 1 (2), Florida 773 (271), Kentucky 9, Tennessee 69 (74), Mississippi 190 (395), Louisiana 174 (209), Idaho 3, Arizona 1 (1), Utah 1, Nevada 1, California 5 (7).

Impetigo contagiosa Vermont 1, Rhode Island 3, New York 91 (71), Ohio 139 (32), Indiana 53 (90), Illinois 35 (36), Michigan 1,425 (1,540), Missouri 54 (55), North Dakota 78 (6), Nebraska 9 (4), Kansas 53 (58), Maryland 4 (10), Kentucky 39 (24), Montana 46 (40), Idaho 69 (80), Wyoming 25 (27), Colorado 77 (66), Nevada 151 (152), Washington 875 (1,044), Alaska 11 (7), Hawaii Territory 59 (61)

Jaundice (including hepatitis and Weil's disease) Maine 11 (32), New Hampshire 2 (4), Rhode Island 1 (1), Connecticut 3, New York 211 (599), Pennsylvania 64 (49), Ohio 2 (7), Indiana 1 (6), Illinois 16 (27), Michigan 17 (13), Minnesota 42 (29), North Dakota 1 (12), Maryland 8 (8), South Carolina 2 (8), Florida 66 (29), Kentucky 72 (5) Tennessee 27 (21), Louisiana 1, Montana 3, Idaho 10 (20), Arizona 6, Nevada 1, Washington 8 (17), Oregon 20 (79), California 107 (166), Hawaii Territory 20 (7), Panama Canal Zone 29

Kala-azar Montana 1, reported in April 1948 Contracted outside the United States.

Leprosy New York 9 (5), Florida 11 (2), Louisiana 7 (7), Texas 10 (16), Arizona 1, California 15 (13), Hawaii Territory 27 (29), Panama Canal Zone 3 (1)

Lymphocytic choriomeningitis Maine 1, Massachusetts 19 (6), Rhode Island 5, Indiana 1, Minnesota 1 (5), Tennessee 11 (13) includes choriomeningitis undefined.

Lymphogranuloma venereum New Hampshire 1, Connecticut 2, Missouri 8 (26), Florida 197 (216), Kentucky 4, Tennessee 68 (99), Mississippi 40, Louisiana 129 (105), Arizona 5, Utah 1, Nevada 1, California 11

Mononucleosis Connecticut 76, Ohio 2, Michigan 126, Minnesota 228, Maryland 31, South Carolina 5, Kentucky 12, Tennessee 29, Oklahoma 1, Montana 1, Idaho 24, Oregon 7

Psittacosis New York 1 (1), New Jersey 1, Pennsylvania 1, Michigan 4 (7), Alabama 1, Washington 1, California 12 (9)

Puerperal septicemia New York 4 (2), Ohio 3, Florida 2 (2), Tennessee 3 (3), Mississippi 5 (8), Arkansas 5, Louisiana 2 (11), New Mexico 1 (4).

"Q" fever Nebraska 1, Arizona 1

Rabies in animals Maine 1, Rhode Island 2, New York 540 (649), Pennsylvania 75, Ohio 637 (761), Indiana 805 (72), Illinois 122 (257), Michigan 306 (313), Wisconsin 4, Minnesota 5 (1), Iowa 35, Missouri 1, Kansas 19 (52), Delaware 1, Virginia 186, West Virginia 2 (8), South Carolina 209 (183), Georgia 240, Florida 332 (436), Kentucky 334, Alabama 370, (473), Arkansas 84 (93), Louisiana 50 (17), Oklahoma 131, Texas 1,271 (1,071), Colorado 2 (13), New Mexico 2 (6), Arizona 47 (50), Utah 1 (7), California 289 (292)

Rat bite fever Ohio 1.

Relapsing fever Texas 79 (62), Nevada 1 (8), California 5 (24), Panama Canal Zone 9 (1).

Rickettsialpox New York City 155

Ringworm of the scalp Connecticut 92, Pennsylvania 95 (1,628), Ohio 111 (79), Indiana 146, Illinois 2,728 (2,543), Michigan 1,555 (1,639), Minnesota 53 (51), Iowa 18 (761), Missouri 95 (16), Kansas 81 (18), Maryland 4 (4), West Virginia 21, Georgia, 54, Kentucky 54 (48), Arkansas 1, Montana 9 (4), Idaho 50 (66), New Mexico 6, Utah 43 (218), Nevada 6 (6), Washington 674 (874), Oregon 4

Scabies Rhode Island 17 (13), Pennsylvania 347 (529), Ohio 105 (84), Indiana 22 (3), Michigan 1,092 (1,092), Missouri 45 (87), North Dakota 34 (16), Kansas 40 (113), Maryland 3, Kentucky 120 (45), Montana 84 (104), Idaho 128 (210), Wyoming 26 (21), Nevada 17 (36), Alaska 26 (4)

Schistosomiasis New York City 35

Silicosis New Hampshire 7 (1), Pennsylvania 1, Kansas 2 (2), Arkansas 5 (3), Idaho 8 (2), Colorado 5, New Mexico 20 (11), Utah 3

Yaws Panama Canal Zone 15

Yellow fever Panama Canal Zone 5 fatal confirmed cases at a point outside the Canal Zone about 22 miles from Panama City

INCIDENCE OF DISEASE

No health department, State or local, can effectively prevent or control disease without knowledge of when, where, and under what conditions cases are occurring

UNITED STATES

REPORTS FROM STATES FOR WEEK ENDED JUNE 4, 1949

The incidence of poliomyelitis declined during the week for the country as a whole. A total of 139 cases was reported, as compared with 155 last week, 149 for the corresponding week last year, and a 5-year (1944–48) median of 71. The largest decrease was reported in Texas (72 last week to 37). Of 8 other States reporting currently more than 3 cases each, all except California (with a decline of 18 to 15) showed increases, the largest as follows (last week's figures in parentheses): Oklahoma 19 (7), South Dakota 7 (1), Tennessee 6 (0), Massachusetts 7 (2). A total of 835 cases has been reported since March 19 (average date of seasonal low incidence), as compared with 878 for the corresponding period last year and a 5-year median of 414.

The incidence of measles, 17,967 cases for the week, while lower than last week (19,834) and below the figures for the corresponding weeks of 1946 (26,347) and 1948 (23,883), is slightly above the 5-year median (16,130).

Of 19 cases of Rocky Mountain spotted fever reported currently (5-year median 23), 5 occurred in Virginia, 4 in Maryland, 2 each in North Carolina and Tennessee, 1 in Montana, and 1 each in 5 Middle Atlantic and East Central States. The total to date is 123. The largest number for a corresponding period of the past 5 years, 88, was reported in 1946 and in 1948.

Of 32 cases of tularemia (last week 20, 5-year median 20), the largest numbers occurred in Arkansas (11), Texas (8), and Georgia (3). The total to date is 530, 5-year median 392.

Of 52 cases of typhoid fever (5-year median 79), only Texas (with 9 cases) reported more than 3 cases.

During the week 1 case of psittacosis was reported in Michigan (Detroit).

Deaths recorded during the week in 94 large cities in the United States totaled 8,731, as compared with 9,008 last week, 8,606 and 9,192, respectively, in the corresponding weeks of 1948 and 1947, and a 3-year (1946–48) median of 9,192. The cumulative figure is 211,044, as compared with 215,021 for the same period last year. Infant deaths totaled 611, last week 661, 3-year median 661. The cumulative figure is 14,342, same period last year 15,098.

Telegraphic case reports from State health officers for week ended June 4, 1949

(Leaders indicate that no cases were reported)

Division and State	Diphtheria	Encephalitis, infectious	Influenza	Measles	Meningitis, meningococcal	Pneumonia	Poliomyelitis	Rocky Mt spotted fever	Scarlet fever	Smallpox	Tularemia	Typhoid and paratyphoid fever •	Whooping cough	Rabies in animals
NEW ENGLAND														
Maine				335		10	1		16			1	16	
New Hampshire				32					2				2	
Vermont				39					1				3	
Massachusetts	13	1		367	1		7		124				69	
Rhode Island				46		3			7				3	
Connecticut	4		2	634		14			14		1		9	
MIDDLE ATLANTIC														
New York	2	5	(4)	1 483	7	161	5	1	[4] 110			3	114	3
New Jersey	4		2	1 214	1	19	2	1	49			2	47	1
Pennsylvania	6	1	(4)	1 789	4		1	1	133			1	101	11
EAST NORTH CENTRAL														
Ohio	7		3	1 698	3	59	1		140			2	67	9
Indiana	8	1		221	1	5	1		27			1	24	
Illinois	2	3	2	287	3	61		1	52		1	1	53	1
Michigan •	2			373	1	33	1		139			1	30	
Wisconsin		1	6	2,032	3	2			44	(2)		1	27	
WEST NORTH CENTRAL														
Minnesota	1			100	2	5	4		24				1	
Iowa				106			2		4					2
Missouri	2			91	3	16	1		14			3	7	
North Dakota			2	31					3			1	1	(2)
South Dakota				76			7		3	(2)			2	
Nebraska			4	135	1	4	3		7				3	
Kansas	1			154		17	1		4				2	
SOUTH ATLANTIC														
Delaware				26	1		1		3				2	
Maryland •	2			55		21		[1] 4	[4] 12			1	2	
District of Columbia				58	1	6	1		2					
Virginia	1		81	694		37		5	11		1	3	50	1
West Virginia			2	33		1			3				14	
North Carolina	4			799	1			2	8				25	
South Carolina	6	2	214	595	2	74	(2)		1				51	4
Georgia	1		30	144	2	175	1		3		3	3	13	8
Florida	4		1	202		27	2		10		2	3	3	2

EAST SOUTH CENTRAL														
Kentucky	6			80	1	14		1	4			2	3	6
Tennessee	3		19	227	2	53	6	2	9			1	34	
Alabama	4		19	223	2	45	1					1	6	4
Mississippi [a]	5		11	52	3	23	3		3				9	
WEST SOUTH CENTRAL														
Arkansas	1		1	189	2	30	2		2		11	1	18	3
Louisiana	1			12	1	5	1		1		2	3		
Oklahoma			7	218	1	13	19		9		1	2	3	1
Texas	18		466	833	4	278	3		9		8	9	108	27
MOUNTAIN														
Montana				282				1	3				1	
Idaho			1	67		1	1		[d] 8				3	
Wyoming				10		2			2				1	
Colorado			4	296		18	1		5			2		
New Mexico	1			17		1	4		4				1	
Arizona	1		21	89		14			5				7	
Utah [a]				86		1	3		4		1		17	
Nevada														
PACIFIC														
Washington	2		23	356			3		26		1		12	
Oregon	2		1	140		14	1		6			3	20	
California	3	3	1	941	3	12	15		[d] 64			1	62	1
Total	117	17	923	17 967	56	1 224	139	19	1 134		32	52	1 046	
Median 1944-48	165	9	924	16 130	108		71	23	2,458	7	20	79	2,079	
Year to date 22 weeks	3,331	217	71 644	519 301	1 782	46 107	[2] 1 757	[1] 123	53 497	[2] 42	530	995	22,476	
Median 1944-48	5 557	193	185 8 9	443 446	3 608		956	82	75 274	215	392	1 180	44 864	
	(27th)		(30th)	(35th)	(37th)		(11th)		(32nd)	(35th)		(11th)	(39th)	
Seasonal low week ends	July 10		July 31	Sept 4	Sept 18		Mar 19		Aug 14	Sept 4		Mar 19	Oct 2	
Since seasonal low week	8,445		107 914	571 694	2 626		[2] 834		76 195	[2] 52		535	32 509	
Median 1943-48 [b]	13 123		329 915	478 392	5 112		414		113 845	301		697	76 130	

[a] Period ended earlier than Saturday

[b] The median of the 5 preceding corresponding periods for poliomyelitis and typhoid fever the corresponding periods are 1944-45 to 1948-49 inclusive

[c] New York City and Philadelphia only respectively

[d] Including cases reported as streptococcal infection and septic sore throat

[e] Including paratyphoid fever reported separately as follows New York 1 Virginia 1 Georgia 1 Florida 2 Colorado 1 Oregon 1

[1] Delayed report Rocky Mountain spotted fever, Maryland 1 case April onset

[2] Deductions—Poliomyelitis South Carolina week ended May 14 1 case Smallpox—Diagnoses changed in certain States weeks ended as follows Year 1949 South Dakota 2 cases March 12 Wisconsin 1 case May 21 Year 1948 Mississippi 2 cases September 18 and October 16 Tennessee 1 case November 6 Oklahoma 1 case November 27 South Dakota 1 case January 1 1949

Psittacosis Michigan 1

Alaska Influenza 14 scarlet fever 1

Hawaii Territory Measles 89

TERRITORIES AND POSSESSIONS

Puerto Rico

Notifiable diseases—4 weeks ended May 28, 1949.—During the 4 weeks ended May 28, 1949, cases of certain notifiable diseases were reported in Puerto Rico as follows:

Disease	Cases	Disease	Cases
Chickenpox	123	Syphilis	106
Diphtheria	18	Tetanus	7
Gonorrhea	94	Tuberculosis (all forms)	375
Influenza	35	Typhoid fever	11
Malaria	24	Typhus fever (murine)	3
Measles	33	Whooping cough	361

PLAGUE INFECTION IN SAN JUAN COUNTY, NEW MEXICO, AND SEVIER COUNTY, UTAH

Under date of June 1, plague infection was reported proved in a pool of 24 fleas from 20 grasshopper mice, *Onychomys leucogaster*, trapped, on May 17, 20 to 23 miles southeast of Bloomfield, San Juan County, N. Mex., along U. S. Highway 44, and in a pool of 298 fleas from 78 ground squirrels, *Citellus armatus*, shot May 12 in Fish Lake National Forest 33 miles southeast of Richfield on Fish Lake Road, Sevier County, Utah.

DEATHS DURING WEEK ENDED MAY 28, 1949

[From the Weekly Mortality Index, issued by the National Office of Vital Statistics]

	Week ended May 28, 1949	Corresponding week, 1948
Data for 94 large cities of the United States:		
Total deaths	9,008	9,013
Median for 3 prior years	8,324	
Total deaths, first 21 weeks of year	202,3[illegible]	206,415
Deaths under 1 year of age	661	675
Median for 3 prior years	675	
Deaths under 1 year of age, first 21 weeks of year	13,731	14,437
Data from industrial insurance companies:		
Policies in force	70,393,900	71,072,486
Number of death claims	13,287	12,697
Death claims per 1,000 policies in force, annual rate	9.8	9.3
Death claims per 1,000 policies, first 21 weeks of year, annual rate	9.7	10.2

FOREIGN REPORTS

CANADA

Provinces—Notifiable diseases—Week ended May 14, 1949.—During the week ended May 14, 1949, cases of certain notifiable diseases were reported by the Dominion Bureau of Statistics of Canada as follows:

Disease	Prince Edward Island	Nova Scotia	New Brunswick	Quebec	Ontario	Manitoba	Saskatchewan	Alberta	British Columbia	Total
Chickenpox		27	3	239	546	31	49	46	115	1,056
Diphtheria				1						1
Dysentery, bacillary							1	1		2
Encephalitis, infectious					1					1
German measles		6		317	64	25	122	40	7	581
Influenza		17			4	2	1			24
Measles		50	4	268	278	193	207	349	351	1,700
Meningitis, meningococcal					1					1
Mumps		17		50	323	16	3	8	48	465
Poliomyelitis		1								1
Scarlet fever		3	1	62	63	2		15	11	157
Tuberculosis (all forms)		14	8	66	28	29	8	13	62	228
Typhoid and paratyphoid fever			3	4						7
Undulant fever					1			1		2
Venereal diseases:										
Gonorrhea	1	7	12	124	61	27	13	28	65	338
Syphilis	2	6	3	77	40	7	6	9	7	157
Whooping cough		1		63	22		1			87

WORLD DISTRIBUTION OF CHOLERA, PLAGUE, SMALLPOX, TYPHUS FEVER, AND YELLOW FEVER

From consular reports, international health organizations, medical officers of the Public Health Service, and other sources. The reports contained in the following tables must not be considered as complete or final as regards either the list of countries included or the figures for the particular countries for which reports are given.

CHOLERA

(Cases)

NOTE.—Since many of the figures in the following tables are from weekly reports, the accumulated totals are for approximate dates.

Place	January–March 1949	April 1949	May 1949—week ended—			
			7	14	21	28
ASIA						
Burma	20	6	7	1	56	1
Bassein	4	6	7		56	
Moulmein				1		1
India	27,968	10,889	[1] 1,523	[1] 871	184	40
Allahabad	1	3	1			
Bombay	[3] 1					
Calcutta	[3] 1,791	[3] 1,458	[3] 238	[3] 212	[3] 173	
Cawnpore	11	15	4	5	6	4
Cuddalore	3					
Lucknow		9	5	4		
Madras	9	15	3	10	3	18
Negapatam	19	6	1			
Raj Samand					1	9
Tuticorin	14					
India (French):						
Karikal	55					
Pondicherry	100					

See footnotes at end of table.

CHOLERA—Continued

Place	January-March 1949	April 1949	May 1949—week ended— 7	14	21	28
ASIA—continued						
Indochina (French):						
Annam	50	3				
Cambodia	11	21		2		
Cochinchina	1	2			1	
Pakistan	10,640	2,470	24	11		1
Chittagong	43	13	3	5		1
Dacca		43	21			
Lahore	5			6		
Siam				6	2	
Bangkok				6	2	

[1] Preliminary figures. [2] Imported. [3] Includes imported cases.

PLAGUE

(Cases)

AFRICA						
Basutoland	12					
Belgian Congo	4	2				
Stanleyville Province	4	2				
British East Africa:						
Kenya	1					
Tanganyika	15					
Madagascar	48	12		[1] 2		
Tananarive	2					
Rhodesia, Northern	2					
Union of South Africa	26					
ASIA						
Burma	[2] 329	[2] 6			5	
Mandalay	1					
Moulmein		4			4	
Rangoon	[3] 2	[3] 2			[3] 1	
China:						
Chekiang Province	5	2				
Wenchow	5	2				
Fukien Province	20					
Kiangsi Province	9					
India	19,202	3,992	[4] 23	[4] 20	[4] 37	
Indochina (French)	30	[6] 31	1	[5] 1		
Annam		7	1	[5] 1		
Cambodia	17	3				
Cochinchina	7	[6] 21				
Laos	3					
Java	2	3				
Siam	136	12				
EUROPE						
Portugal: Azores	3					
SOUTH AMERICA						
Peru:						
Lambayeque Department	7					
Piura Department	3					
Venezuela:						
Aragua State		1				
OCEANIA						
Hawaii Territory: Plague infected rats						

[1] May 1-10, 1949.
[2] Includes imported c
[3] Imported.
[4] Reports from Calcutta and Cawnpore only.
[5] Pneumonic plague.
[6] Includes cases of pneumonic plague.
[7] Plague infection has been reported in Hawaii Territory as follows: On March 12, 1949, in a mass inoculation of 2 pools of tissue from 10 rats (8 and 2), taken on Maui Island, on March 16, 1949, in mass inoculation of 3 pools of 29 fleas (7, 12, and 10), from rats trapped on the Island of Hawaii.

SMALLPOX

(Cases)

(P = present)

Place	January-March 1949	April 1949	May 1949—week ended— 7	14	21	28
AFRICA						
Algeria	87	11		[1] 5		
Angola	118					
Belgian Congo	[2] 543	[2] 199				
British East Africa:						
Kenya	9	4				
Nyasaland	542	146	11	39		
Tanganyika	122					
Uganda	30	2				
Cameroon (French)	13	6		[1] 5		
Dahomey	152	34		[1] 10	[3] 6	
Egypt		2				
Ethiopia	1					
French Equatorial Africa	4	2		[1] 8		
French Guinea	1					
French West Africa: Haute Volta	43	14		[1] 2		
Gambia	5	35				
Ivory Coast	86	83		[1] 1		
Morocco	6	1		[1] 1		
Mozambique	53	3				
Nigeria	1,149	435				
Niger Territory	119	133		[1] 49		
Portuguese Guinea	1					
Rhodesia:						
Northern	4					
Southern	135					
Senegal	14	1				
Sierra Leone	76	4				
Sudan (Anglo-Egyptian)	28	1	8	14		
Sudan (French)	82	54				
Togo (French)	46	11		[1] 5	[3] 1	
Union of South Africa	124	P	P			
ASIA						
Afghanistan	15					
Arabia	30	[4] 4				
Bahrein Islands	[4] 37	9				
Burma	760	[5] 55	[5] 12	[5] 15	[5] 12	[5] 6
China	[4] 651	[4] 96	[4] 11	[4] 17		
India	22,083	13,607	1,233	724		
India (French)	1					
India (Portuguese)	124	23				
Indochina (French)	1,950	166	17	25	3	2
Iran	156	18	1	1		
Iraq	245	18	7	5	[4] 8	27
Israel	2					
Japan	16	23	8			
Java	1,993	1,174	[6] 150	[6] 246	[6] 297	[6] 240
Korea	544					
Lebanon	112	9	1	5		
Malay States (Federated)	42	1				
Pakistan	1,880	302				
Philippine Islands:						
Mindoro Island	2					
Tablas Island		2				
Portuguese Timor	4					
Siam	37					
Straits Settlements: **Singapore**	[4] 2					
Sumatra	[4] 36	13		8	7	4
Syria	221	41	1	23	19	19
Transjordan	91	51	8	7	4	4
Turkey. (See Turkey in Europe.)						
EUROPE						
Great Britain:						
England and Wales		[7] 11	1	2		1
Italy	2					
Portugal: **Lisbon**	3					
Spain		1				
Turkey	83	4		1		
NORTH AMERICA						
Cuba: **Habana**	2					
Guatemala	1					
Mexico	7	7				

See footnotes at end of table.

SMALLPOX—Continued

Place	January-March 1949	April 1949	May 1949—week ended— 7	14	21	28
SOUTH AMERICA						
Argentina		[2, 8] 54				
Brazil	[2] 55	[2] 6			[9] 1	
Colombia	556	20				
Ecuador	[2] 348	[2] 59				
Paraguay	[9] 1					
Peru	387	298				
Venezuela	[2] 522	[2] 9		[9] 28		

[1] May 1-10, 1949.
[2] Includes alastrim.
[3] May 11-20, 1949.
[4] Includes imported cases.
[5] In Moulmein and Rangoon only.
[6] In Batavia only.
[7] Imported.
[8] January 1-April 30, 1949.
[9] Alastrim.

TYPHUS FEVER[*]

(Cases)

(P=present)

AFRICA						
Algeria	27	12		[1] 3		
Basutoland	5					
Belgian Congo	[2] 31	[2] 10				
Egypt	65	87				
Eritrea	22	9				
Ethiopia	115					
Libya	65	33	2			
Madagascar: Tananarive	[2] 3					
Morocco	8	1				
Tunisia	20	32				
Union of South Africa	[3] 42	P	P			
ASIA						
Afghanistan	1,191					
Arabia: Aden	[4] 1	1				
Ceylon: Colombo	[2] 2					
China	3	2				
India	111	[4] 1	[4] 1			
India (Portuguese)	5	2				
Indochina (French)	1	2	1	2		
Iran	62	48	1			
Iraq	13	8	3	1	1	
Japan	[5] 60	15				
Korea	125					
Lebanon	[2] 1					
Pakistan	320	180	9	11	19	
Palestine	100					
Philippine Islands: Manila	1					
Straits Settlements: Singapore	[6] 1					
Syria		2	2	6	5	
Transjordan	11	31	6	1	1	
Turkey. (See Turkey in Europe.)						
EUROPE						
Belgium	1					
Bulgaria	71	94	31			
Czechoslovakia	2	6	1			
France	2					
Great Britain: Island of Malta [3]	1	2				
Greece	[3] 21	[3] 1	[3] 2	[3] 2		
Hungary	12	3		1	1	
Italy	27					
Sicily	13					
Poland	150	29				
Portugal: Lisbon	2	2				
Rumania	297					
Spain	1		1			
Turkey	70	21	1	1	8	2
Yugoslavia	82	19		1	10	

See footnotes at end of table.

TYPHUS FEVER—Continued

Place	January-March 1949	April 1949	May 1949—week ended—			
			7	14	21	28
NORTH AMERICA						
Costa Rica [3]	8	5				
Cuba [2]	1	1				
Guatemala	7					
Jamaica [3]	5	1				
Mexico [3]	46	11	6			
Puerto Rico [3]	5	2			1	2
SOUTH AMERICA						
Bolivia	8					
Brazil	2					
Chile	42	31	9			
Colombia	574	34				
Curacao [2]	2	1				
Ecuador [3]	84	23	1	2		
Peru	5	2				
Venezuela [2]	8	7			1	2
OCEANIA						
Australia [2]	33	17	1			
Hawaii Territory [2]	3					

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[1] May 1-10, 1949.
[2] Murine type.
[3] Includes murine type.
[4] Imported.
[5] Corrected figure.
[6] Type unspecified.

YELLOW FEVER

(C—cases; D—deaths)

AFRICA							
Belgian Congo:							
Stanleyville Province	D	5					
Gold Coast:							
Komenda [1]	D			[2] 1			
Nigeria:							
Lagos	C	[3] 2					
NORTH AMERICA							
Panama:							
Pacora	C	[4] 8					
SOUTH AMERICA							
Brazil:							
Amazonas State	D	1					
Para State	D	1	[5] 1				

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[1] Between Sekondi and Cape Coast.
[2] Reported May 2, 1949.
[3] Cases admitted to Lagos Hospital from ship that arrived from two other ports in Nigeria—Warri and Burutu.
[4] Reported January 15, 1949. Date of occurrence November 11-December 30, 1948. Five cases, all fatal, confirmed; 3 suspected cases.
[5] Reported April 6, 1949, at Acara.

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